

The MINING CONGRESS JOURNAL

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No. 8

IN THIS ISSUE

Geologic Data In Other Than Copper Mines

Ore Estimating In Mines Other Than Copper

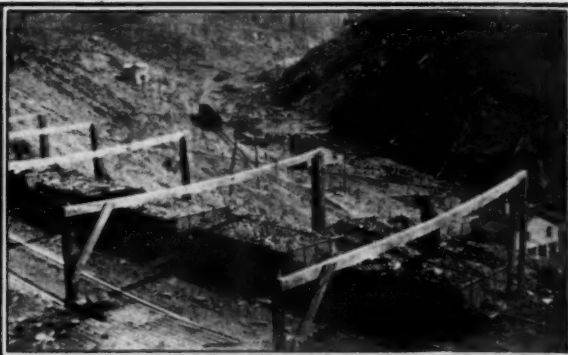
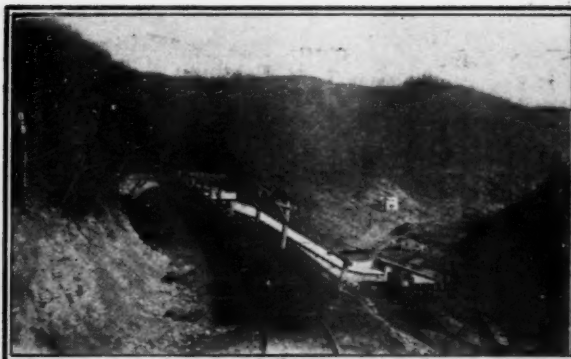
**Standardization of Methods of Observing and
Recording Geologic Data In Copper Mines**

Whiskerinos and the Days of '49

Metal Mining During First Half of 1924

Contributors:

*Guy N. Bjorge, J. Kruttschnitt, Jr., Louis E. Rober, Jr., H. A. C. Jenison, Bert F. Heus,
Lewis E. Aubury, George H. Cushing, Victor C. Alderson.*



Scenes at No. 1 Mine, Lillybrook Coal Co. The haul at this mine is about one mile, the cars carry approximately two tons of coal and turn twice a day on an average.

Seven Years Young

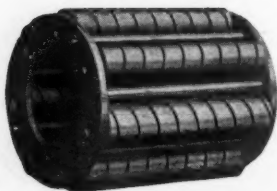
MR. J. R. HORN BROOK, General Manager of the Lillybrook Coal Company, is well pleased with the simple construction and durability of the Hyatt equipped wheels under 500 of his mine cars. Some of them are almost seven years old.

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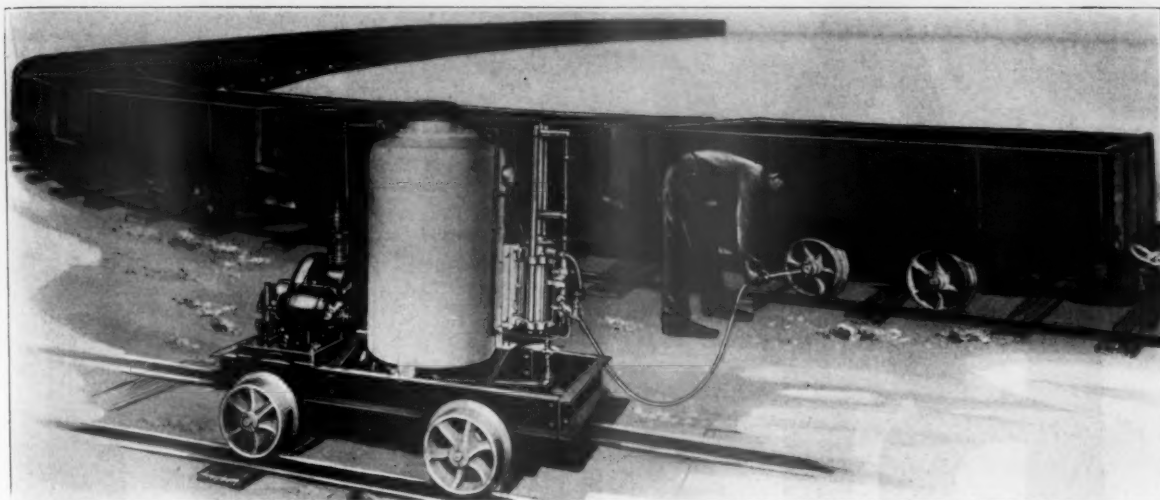


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THE MINING CONGRESS JOURNAL

AUGUST, 1924

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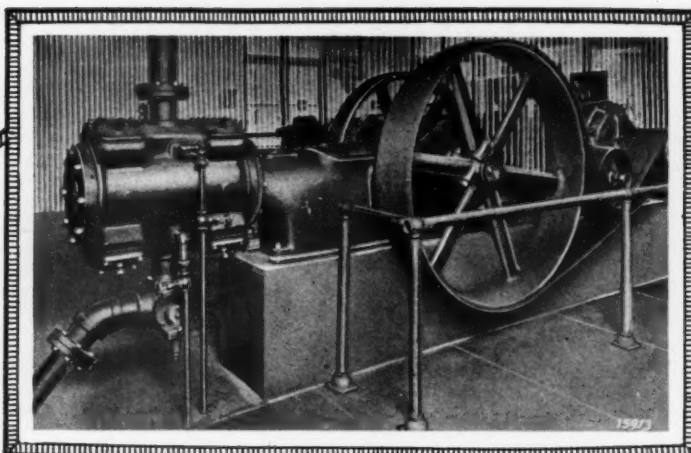


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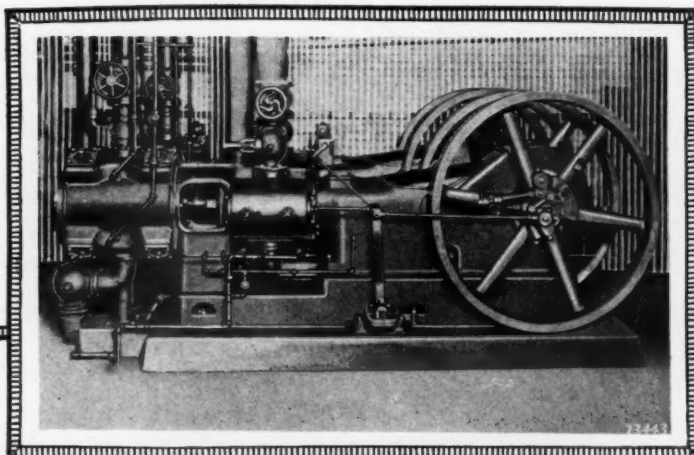
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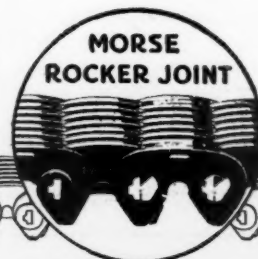
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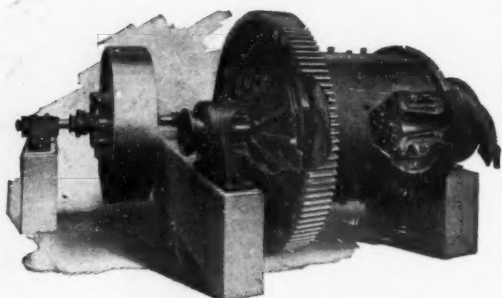
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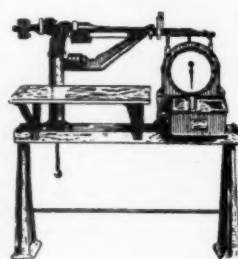
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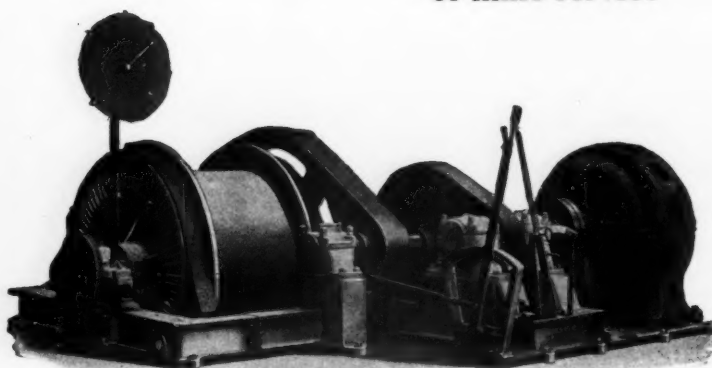
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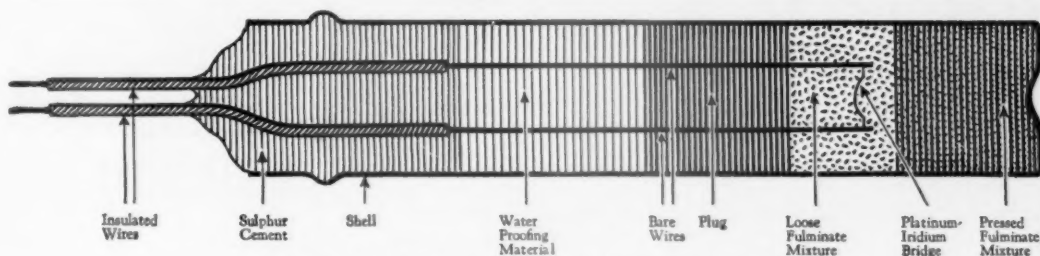
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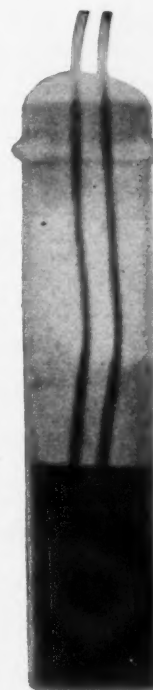
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EAST and WEST— and the twain must meet

Attention Mr. Coal Operator!

Held in the West in a metal mining district, the 27th Annual Convention of the American Mining Congress gives a much needed opportunity for Coal Men to carry their message to the other branches of the industry and to present their imminent and pressing problems to *those who must unite with them* if the coal industry is to function and advance under private ownership.

At this convention is to be formulated a national platform for the mining industry that will be presented to the Congress of the United States. The formulation of this platform should play an interesting part in the national political campaigns now under way. Minority political groups are urging government ownership of mines, prohibitive taxation, and are fostering industrial unrest in such a way, that, win or lose, their doctrines are dangerous.

Your opportunity to take part in the formation of this platform of the mining industry, and to get the united effort of all mining men behind your problem (*which in reality is the problem of everyone interested in private initiative and an economically sound America*) is at the Convention at Sacramento.

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THIS MEETING IS IMPORTANT—its urgency can not be too strongly forced upon members of all branches of the mining fraternity. It is important to the industry as a whole and to each of its branches. That each side may present its story and that a solid front may be presented to the public is doubly important this year when so many big issues are at stake.

National doctrines that would work havoc in the industry are being promulgated. International unrest finds its way into a growing tendency to governmental paternalism that rests heavily upon the mining industry. A definite policy of publicity and public education must be evolved—especially in view of some of the national political campaign issues, which even in defeat are dangerous doctrines.

MATTERS OF IMPORTANCE

The present oppressive tax burdens and tendencies must be relieved if projects as hazardous as mining—and as helpless before the encroachments of Federal, State and Local Governments—are not to suffer heavily.

Financing mining enterprises has been seriously hampered by the attitude of the public and many important financial houses. A representative group of bankers will be invited to Sacramento to work this problem out with us.

Gold production, one of the greatest assets of the country, has dropped 50 percent in eight years. A constructive policy, looking to the building up of this industry must be initiated.

Silver as a basis for subsidiary coins would assist in stabilizing international commerce and at the same time relieve the difficult situation the silver producers of this country find themselves in. A full discussion of plans is outlined for the Sacramento meeting.

Coal is the target that government control advocates have been shooting at. Coal producers problems are, in the main, misunderstood. At Sacramento they will have opportunity to tell their story to metal miners and the public. That is the purpose of assigning coal a place on the convention program.

Industrial Relations, Standardization of Mine Equipment and Mining Methods, imminent Tariff questions affecting especially lead, zinc, manganese, magnesite, and tungsten, are other vital topics for consideration.

In conjunction with the convention will be held an extremely interesting Exposition of Mines and Mine Equipment. The exposition will be a special feature of the Sacramento Convention.

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Leaving Chicago at 10:15 a.m. Tuesday, September 23d, it will arrive in Denver early the next afternoon. Here a local committee is arranging a delightful series of entertainments, including tours of scenic points in and about the city, and a banquet where the visitors will meet mining men from all parts of Colorado.

The next day in Colorado Springs they will be offered their choice of inspecting the famous Cripple Creek gold mining district, scenic trips, horseback riding, or spending the time on the golf courses. Headquarters will be the famous Broadmoor Hotel.

Next morning the train will pass through some of the most famous scenery of the Rocky Mountains, including the Leadville District, Tennessee Pass, and Echo River Canyon. Crossing Colorado and entering Utah the following day, it will reach the Black Hawk coal mine of the United States Fuel Company, where a two-hour stop-over will be made.

Salt Lake City will be reached the next morning. A get-together breakfast will be held at Hotel Utah, followed by scenic tours, an organ recital in the famous Mormon Tabernacle, a visit to the Utah Copper Company mine at Bingham, and to other copper, lead, and silver mines, with a banquet and dance in the evening.

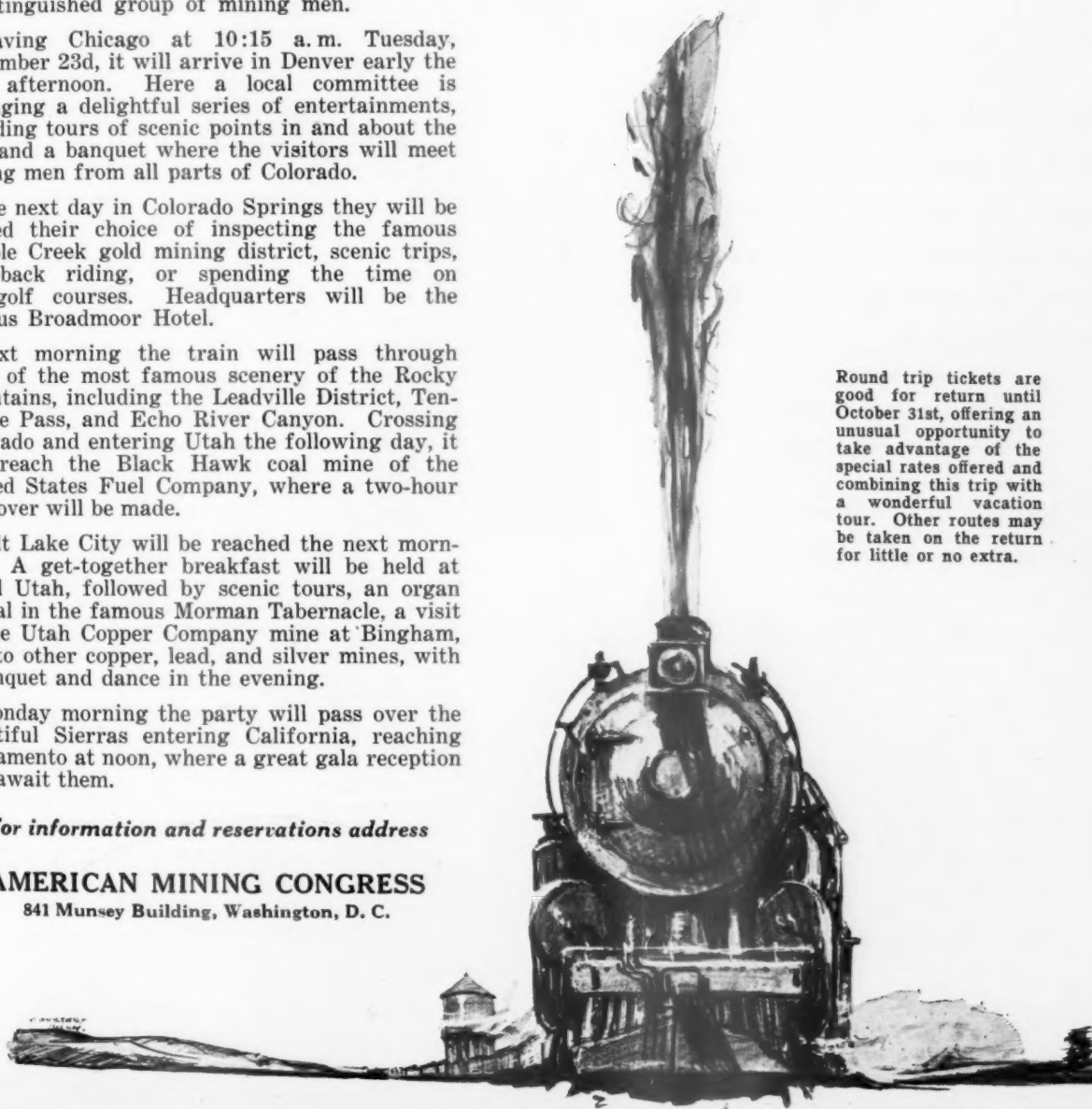
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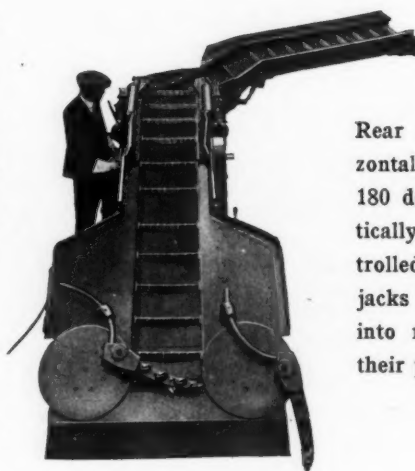
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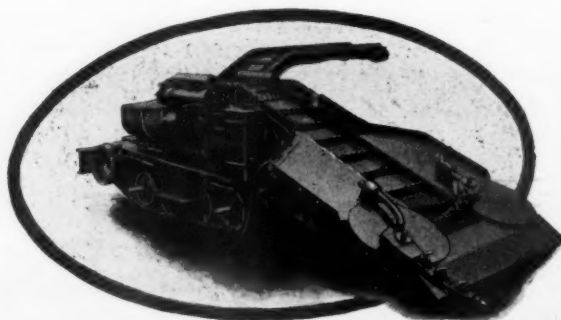
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VOLUME 10

AUGUST, 1924

NUMBER 8

INCOME TAX ADMINISTRATION

THE Natural Resources Audit Division of the Income Tax Unit has been abolished. The mine accountants among its personnel have been assigned to the Personal, Corporation, and Consolidated Returns Audit Divisions to take the "run o' th' mill," sometimes natural resources cases and sometimes finance, trading, transportation, and other cases of a different class or group.

The valuation problems of mining companies will continue to receive the specialized consideration of the Engineering Division, but their accounting problems will not have such special consideration. According to a statement of Commissioner Blair: "The determination of tax liability, once a valuation has been made, is no different in the natural resources industries than in other industries."

This is an erroneous conclusion. That the accounting problems of mines and other natural resources are different from those of other industries has been recognized quite generally in treatises on taxation and accounting published since the incidence of Federal income taxation. Many of the differences are easily demonstrated by reference to provisions of the revenue laws. There are many conditions and considerations that are found only in the cases of natural resources.

(1) Natural resources properties usually are acquired for stock, and invested capital computations depend very largely upon valuations and appraisals. Manufacturing, trading, transportation, finance, etc., usually are formed by the issuance of stock for cash paid in, and properties are acquired for cash.

(2) Depletion allowances on the basis of cost, March 1, 1913, value, and, in some cases, discovery value, make complications in the determination of statutory income and invested capital in order to properly allow for realized appreciation. Realized appreciation has been handled erroneously probably more frequently than any other item in mine accounting.

(3) Depletion allowed on the basis of the 5 percent limitation prior to 1916, when less than depletion actually sustained, adds to the complications involved in the determination of statutory income and invested capital.

(4) In the case of sales of mines, oil and gas wells, where the principal value of the property sold has been demonstrated by the taxpayer through prospecting, development or discovery, the tax on profits from such a sale is limited to 16 percent of the sale price in the 1921 revenue act, and to 20 percent in the 1918 act.

(5) The necessity for continuous discoveries of new reserves as anticipated reserves are exhausted or pinched out, the variations in the grade of ore in the case of metal mines, the fluctuation in selling prices, and the continual occurrence of unexpected disasters, such as

explosions, fires, cave-ins, etc., make it impossible to compute with mathematical accuracy and in accordance with ordinary accounting principles the proper annual amortization or return of investment.

(6) In the case of mines, and oil and gas wells, the revenue department must deal to a large extent with unknown factors, and, as the mining or well operations proceed, these unknown factors gradually become known and the computation of net profits change accordingly.

The ordinary accountant, who is inexperienced in the intricacies of mine accounting, very naturally approaches audit questions in natural resources cases by applying the orthodox principles of a standardized business (to paraphrase the statement of a leading authority on mine accounting), and starts out on the wrong track by overlooking the fact that it is impossible to be scientific in computing the net profit in any natural resource operation until the operation is completed.

In any other industry, according to this authority, the advocacy of shifting accounting methods as conditions vary might justly be termed accounting heresy; but the rapid accumulation of ridiculous and disastrous accounting results, due to rigid adherence to a theory or rule, is sufficient justification for the application of common sense in dealing with the speculative problems of mine accounting.

In accounting for net profits of mining ventures or other natural resources operations, there must be flexibility and adaptability of methods to meet the conditions that exist in each different operation. Only experienced mine accountants can give the cases of mining companies the specialized consideration required to attain fair and reasonable adjustment of tax liability.

The wisdom of abolishing the Natural Resources Division will, of course, be determined by future results. It is the Commissioner, rather than any taxpayer or group of taxpayers, who shall say how the taxpayers' accounts should be audited. If unfair and unjust results obtain and demonstrate that the new plan is unsatisfactory from the standpoints of both the Government and the taxpayer, Commissioner Blair should not hesitate to reestablish the divisional organization plan where the work of the auditors who analyze the accounts can be closely coordinated with the work of the engineers who analyze the operations and know the properties.

Government auditors who are unfamiliar with natural resources operations, conditions, problems and terminology will be unable to make fair and intelligent tax determinations. It is essential that the Income Tax Unit shall keep experienced natural resources accountants on the audit work in natural resources cases. This much the taxpayers of the natural resources industries have a right to expect.

THE ONE THING NEEDFUL

WHEN the Democrats were having a little difficulty to settle on a candidate, Mr. George Harvey sat in Washington and wrote an editorial at them. In it he used this powerful phrase:

"We can furnish the enlightenment; we cannot supply the understanding."

The same powerful expression applies with some force to the coal industry if not, indeed, to all industry. That is to say, the coal industry has abundant enlightenment on every phase of its complex business. Its leaders, for several generations, have been studying its problems. They have been giving the results of their studies to their fellows. In recent years college professors and public officials have studied coal and have contributed the results of their studies to the industry. In addition, many associations have been created and have functioned in the coal industry. They, in time, have made their contribution to the common knowledge. All these students have come and gone leaving behind them a library of clean-cut statement of facts. As a result, the literature of the coal industry is so replete with statement of facts, it is doubtful whether any single problem of the industry remains unventilated. We have about all of the information that is necessary to a solution of almost any coal problem.

The question is whether the coal trade understands what it has learned. The facts are put before it. It reads the facts every day and then goes about doing the same old thing in the same old way. The information challenges the attention of the eye and of the ear constantly, but, obviously, it has not yet commanded the attention of the understanding. One thing is certain; namely, no practical use has been made of all the information which has been gathered.

The theory has been and is that we ought to get more information. Some have even assumed that we have no information at all—a clear misstatement of the fact. Even among coal men, there is a belief that we should have more of the same kind of information. To that end, there are even suggestions that we create new organizations to do over again what already has been done; that we ought to compile in a new form the information which we have in so many diversified forms. The suggestion is even that we should spend enormous sums of money in this quest of further information.

With all proper deference to those who would spend government money for coal records and to those who would spend more of the trade's money for replicas of existing records, we believe that the one thing needful is not more information but more understanding of known and available information. We believe it is needful to gain that understanding which will put existing information to some practical use.

It would be possible to illustrate this point in many ways. That is, it would be possible to show what everybody knows about the influence of a certain form of control of labor. It would be possible to show what are the effects of certain production policies. It would be possible to show what are the effects of intensified individualistic action in a district where essential problems are those of the community. However, those would raise controverted points and lead off into disputation. Therefore, we prefer to draw the illustration from one thing about which there is no controversy.

The one undisputed and known fact is that the one thing which most retards coal trade progress is that each man believes himself virtuous and his neighbor corrupt; himself the sources of integrity and altruism

and his neighbor the embodiment of dishonesty and pig-headed selfishness. And when each man believes that way he decides to follow what he believes to be the practice of the trade rather than respond to the dictates of his own conscience. On the contrary, the facts are that the average man in the industry is remarkably clean. The average conception of a coal man's duty to society is decidedly of a high order. Thus the facts lead one way and beliefs another. Therefore, the thing needful is to get each coal man to understand the facts to such an extent that he will put them into practice.

On that subject we need no more information; indeed, no more information can be gathered. We are through with research. The only thing necessary is to get men to understand what they know and to act upon it. In a word, we have enough of enlightenment; we have too little of understanding.

WOOD PRESERVATION AND MINING

MUCH interest attaches to the announcement of the University of Pittsburgh of the establishment of a fellowship on treatment of mine timbers.

Less than four years ago the mining industry was apathetic concerning either the source of supply or the conservation of timbers in place in the mine.

The steadily diminishing timber supply, in both coal and metal fields, and the fire hazard in the metal field, led the American Mining Congress to undertake, under its Standardization Division, a study of the mine timbering question. This committee has made two reports, both of which have attracted wide attention. The reports of the section on wood preservation have received the earnest consideration of mining men, with the result that several new methods of treating timbers have been brought out.

It appears that Europe—especially Germany—is considerably in advance of America in this science. Recently two foreign preservatives, aczol and wolman salts, have been introduced into the United States. There are also three additional foreign methods which have come to the attention of the committee. Their report to the Fifth Standardization Conference at Sacramento, September 24, will discuss these five foreign methods, in addition to the well-known American methods, including zinc chloride, which the fellowship at the University of Pittsburgh is studying.

The Mine Timbering Section of the American Mining Congress welcomes the cooperation of all agencies in a proper solution of this important subject. Proper conservation of timber means millions of dollars to the nation as well as a huge monetary saving and increased safety hazard to an individual mining company.

Some comprehensive cooperative plan should be inaugurated whereby a thorough test may be made of the various methods under consideration in order that the stamp of approval may be given by a reliable agency that can carry sufficient weight to attract widespread adoption of any method or methods it may approve.

The Forest Service Laboratory is equipped to make this investigation. Its experts have been studying the problem in a most efficient manner and, while holding no brief for that organization, it is to be hoped that not only will mine operators generally, but all those agencies working to the same end, cooperate with them and the American Mining Congress Committee in this important work. Much duplication of effort can be eliminated through such cooperation and the result made of lasting benefit to the industry.

SENATOR PEPPER AND THE SHOPMEN'S INJUNCTION

IT MAY be freely admitted that the American system of jurisprudence is not perfect. It is true that delays in the final determination of civil cases are both expensive and aggravating and it is true that highly paid lawyers are frequently able to delay the final penalties which criminals may have justly earned.

It is to be regretted that criticisms of our courts as a rule are not leveled against the real defects of our system but more largely against those features which bring greatest credit to our system and which tend most surely to the prevention of crime and lawlessness.

A distinguished United States Senator, Mr. George Wharton Pepper of Pennsylvania, at a recent meeting of the American Bar Association called attention to the "growing bitterness of organized labor toward the Federal Courts which if not checked may easily develop into a revolutionary sentiment." Senator Pepper compared the British and American attitude toward organized labor as reflected in legislation and legal policy and called attention to the fact that Great Britain "recognized peaceful picketing as a legitimate concomitant of a strike, and had trained the guns of criminal procedure upon conduct which threatens breach of the peace or invasion of private right." Without reference to the principles involved the decadence of Great Britain's industrial prosperity is a sufficient answer to this argument even from the standpoint of the man who wants a job. Senator Pepper made particular reference to the railroad shopmen's injunction order. If there is any one thing certain to "develop into a revolutionary sentiment," it is such statements from prominent public men indicating their sympathy and tacit justification of those who discredit the integrity of our courts.

It is true that the injunction order of 1922 was very comprehensive in its requirements—it is also true that it had need to be comprehensive in order to meet the various kinds of lawlessness which, if history had repeated itself, would soon have been in progress over the lines of the 261 railroad systems of the country, which without this injunction would have been unable to have carried out their contract with the people to furnish those transportation facilities which are an absolute necessity to our modern day life.

The injunction was intended to prevent and largely did prevent those who planned to hamper the operation of the railroads of the country until their personal demands had been satisfied. It grew up around that fallacious doctrine that a workman has a vested right in a job which he has abandoned.

Not only is this doctrine fallacious but it is the most dangerous doctrine that could be imagined with relation to the rights of others. Rights and obligations are necessarily reciprocal. If the workman while refusing to work has a vested right to hold his job the employer is entitled to require his service. Whenever any employer is put in position that he has the right to demand the service of a man against his will the personal liberty of the workman is in danger.

It must be remembered that the bulk of these criticisms come from those who themselves are unwilling to obey the law. What does a man ask when he asks for the protection of the court in anticipation of violence? He asks that he be permitted to retain peaceful possession of his property. That is all. And that is all any court can grant. Probably the most comprehensive injunction which has ever been issued as it

relates to the labor question was the shopmen's injunction order of 1922 to which Senator Pepper makes particular reference. Possibly no other injunction ever issued engendered to so great an extent the "growing bitterness of organized labor toward the Federal Courts." Why? Because no other injunction so justifiably prevented so great a body of men in their efforts to enforce their demands against the interests of the entire remaining population of the country by a method which would have paralyzed the industries of the nation.

The injunction forbids the shopmen from—

"Interfering with, hindering or obstructing said railway companies, or any of them, their offices, agents, servants or employees in the operation of their respective railroads * * *," "and from preventing or attempting to prevent any person or persons from freely entering into or continuing in the employment of said railway company." "From loitering or being unnecessarily in the vicinity of the points and places of ingress or egress of the employees of said railway companies." "Trespassing, entering or going upon the premises of the said railway companies, or any of them, without their consent, at any place or in the vicinity of any place where the employees of said companies, or any of them, are engaged." "From inducing or attempting to induce with intent to further said conspiracy by the use of threats, violent or abusive language, opprobrious epithets, physical violence or threats thereof, intimidation, displays of force or numbers, or jeers, any person or persons to abandon the employment of said railway company."

Then follows the paragraph of said injunction order which embodies the most objectionable features because of its relation to the practice of picketing. In this section defendants are enjoined from—

"engaging, directing or procuring others to engage in the practice commonly known as picketing, that is to say, assembling or causing to be assembled numbers of the members of said Federated Shop Crafts, or others in sympathy with them, in the vicinity of where the employees of said railway companies, or any of them, are required to work and perform their duties, or at or near the places of ingress or egress, or along the ways traveled by said employees thereto or therefrom, and by threats, jeers, violent or abusive language, violence or threats of violence, taunts, entreaties or arguments, or by any similar acts preventing or attempting to prevent any of the employees of said railway companies, or any of them, from entering upon or continuing in their duties as such employees."

Except upon theory that the striking workmen had a vested right in their employment none of the things enjoined could possibly interfere with their rights. There can be no question that every enterprise has a right to conduct its legitimate business affairs without interference on the part of outsiders. This freedom from interference should more particularly be guaranteed to a transportation company which under the law has an obligation to perform to the public which it cannot escape without incurring severe penalties and where such failure means inconveniences, suffering, and perhaps death to so many people.

The growing bitterness of organized labor to the Federal Courts to which Senator Pepper refers has no justification. It is as much the business of government and the courts to protect the rights of one citizen as another.

Senator Pepper suggests a solution of this problem in the following words:

"Wherever organized labor has failed to create an overwhelming sentiment for the closed shop it cannot in the absence of such a sentiment successfully do the thing which otherwise public opinion would approve."

There is one startling example in which the plan proposed by Senator Pepper was carried out. At Herrin, Ill., twenty-one persons were brutally massacred because they were willing to work upon terms mutually agreed upon with their employers. In that community there

had been created "an overwhelming sentiment for the closed shop." These brutal murders were committed in broad daylight without any effort at concealment; the perpetrators were well known to the whole community and yet no one has been convicted and no one will be convicted for the commission of these dastardly crimes simply and only because "organized labor had created an overwhelming sentiment for the closed shop" in that community.

MINING CONGRESS JOURNAL will agree with Senator Pepper that "the maintenance of well-nigh universal confidence in the judiciary is nearly essential to our National safety," but it insists that no such universal confidence can be secured when courts fail to protect the rights of all citizens alike without reference to their affiliation, or their standing in the community. The property of the worker must be held as sacred as the property of the railroad company and *vice versa* the property of the railroad company must be held equally sacred with that of the worker. The personal right of each individual to work for whom he pleases and under terms and conditions that are satisfactory to him must be protected else there can be no respect for the courts or the Government that maintains them.

Respect for the courts cannot be enhanced or maintained when those courts yield to popular clamor against the rights which are guaranteed by the laws of the country under our Constitution.

The most lamentable, the most dangerous tendency in our public life today is any disposition on the part of public men to yield to popular clamor for the sake of personal popularity. This is particularly true as it relates to the trained lawyer of successful experience who, because of public position and personal standing, possesses an enhanced power for either good or evil, either in support of the Constitution and laws of the country or in subtly undermining those fundamental principles without which our Government cannot continue.

NOT CONVINCING

NOW that the Congress has adjourned and the members have gone about their other business, the bonus which it voted to give to the soldiers is proving to be about the most distasteful piece of legislation enacted. The passage of this bill appears to have been a bad case of judging public opinion. And those who voted for it, only to find their constituency opposed, are prone to make excuses. The one such excuse which carries least conviction is the statement that "if we had not voted for this bill, the country would have been saddled with one that would have proved infinitely worse."

The assumption upon which this rests seems to be that if a majority of either house had said that the country could not afford to give two dollars in the form of insurance spread over twenty years the same majority would have later been forced to say that the country could easily afford to pay five or ten dollars in cash at once. The statement, to say the least, is rather a bad display of logic.

This incident is mentioned because it is typical of many statements which have been employed for some years in Washington. For instance, the coal people when dealing with the Government, were told that if they failed to surrender their private information to public scrutiny, they would have to submit to far more rigorous regulation—probably to have their prices fixed. This meant to say that if the operators would not consent, contrary to the Constitution, to an invasion

of their private office and to the examination of their books, the Government might, under the same Constitution, virtually take their property, by fixing the selling price on it—and use the book information as foundation for the price paid under confiscation. That is, the failure to acquiesce in one unconstitutional act would force the Government to commit two unconstitutional acts.

On the same faulty logic—or rather statements which were devoid of logic—various interests have been urged to submit to this or that encroachment upon their liberty on the threat that if they did not surrender the little that was now exacted, the whole would quickly be taken.

It has been a peculiarity of all of these assaults upon the liberties of the people that the members of Congress or the administration who used this form of forceful persuasion said that "they" would put something over, etc. Always the word "they" crept into the conversation about various distasteful bills. "They" played a very big part in the passage of the bonus bill. "They" played a big part in the passage of all railroad legislation. "They" has been the congressional Boogey man for almost a generation. But, up to this minute, nobody has ever been able or willing to go further and identify to whom "they" referred.

Not for the purpose of argument but for the purpose of information, "they" is a pronoun. A pronoun is a word used instead of a noun. A personal pronoun like "they" is a word used instead of a proper name or names. If the word "they" is properly used by any member of Congress, it is quite evident that it refers to gentlemen with known names and known street addresses. Presumably—since the aggregation referred to amounts to a majority of both House and Senate—the word "they" identifies quite a company of men. If that company is so numerous, it should be easily possible for those who use the word "they" so glibly to mention, occasionally, a name or two—perhaps only the leader of the majority or the bloc. And if that leader, with such a following, has such a destructive and terrifying program that is about to be forced upon the Congress, a word or two, giving the outline of the program, should be made public.

In the complete absence of any such definite information, the people are beginning to believe that they have been hoodwinked into an action that is distasteful only to run away from a destructive majority which does not exist.

The whole thing fails to carry conviction because it suggests that the alleged destructive majority is pictured as having been held in check by the continuingly effective efforts of a compromising minority.

The coal people have been stampeded into so many actions by the use of this meaningless "they" that the leaders of the coal industry are in a mood to demand some specifics the next time the pronoun is sprung upon them. Frankly, the whole trick has been overplayed. Those who threaten the business people with the confiscation of their property and the people with the complete loss of their liberty will have to be a little more explicit in future if their word is to be taken at its face value. If there is a majority in Congress which will do the dangerous and destructive things predicted for them, it is due the people that the names be made public. It is due the people that—before these men are reelected—they be given a definite outline of what sort the program these gentlemen are really disposed to put over and would put over if it were not for a clever and compromising minority.

SILVER'S OPENING WEDGE

AT THE CLOSE of the New York Silver Conference held in November of last year and the later conference with Secretary of Commerce Hoover with reference to the attitude which might be taken by the Federal Trade Commission upon the proposed Silver Export Association, it seemed very apparent that the Federal Trade Commission would not and possibly could not give any decision with reference to a Silver Export Association which would serve the purpose of the American silver producer in the development of a market which would justify continued operation of the silver mines of the country.

With the exception of a few high-grade mines, the other strictly silver producing mines could not produce at a profit on a 60-cent market. It was also apparent that until those European nations which had discarded and melted up their silver coin during the war were induced to readopt the use of silver in their subsidiary coinages the ordinary industrial demands of the world would not be sufficient to absorb the silver output.

With this thought in view the American Mining Congress undertook various inquiries looking to the finding of new markets for silver. In pursuing these inquiries the Secretary of the American Mining Congress consulted Hiram Barney, formerly chairman of the International Finance Committee of the American Exporters and Importers Association, who suggested that there was a possibility that Poland might become a purchaser of silver for the coinage of subsidiary coins in connection with Poland's program of financial stabilization which was inaugurated about the first of this year.

These investigations led to a preliminary conference at the office of the U. S. Smelting, Mining and Refining Company, New York City, on January 17, 1924, at which were present Mr. F. Y. Robertson, of that company; Mr. F. H. Brownell, of the American Smelting & Refining Company; Mr. C. F. Kelley, of the Anaconda Copper Mining Company; Mr. Hiram Barney, now one of the legal counsel of the Polish Government; Mr. Hipolit Gliwie, counsellor of the Legation of Poland; Mr. L. Orłowski, then Polish Vice Consul in New York, now secretary of the Legation at Washington; and the Secretary of the American Mining Congress.

At the conference it was suggested that Poland might be able to absorb a very large amount of silver in coins, that possibly as much as fifty million ounces of silver would be required before the point of saturation was reached in Poland, taking into consideration the coins which would naturally drift into neighboring countries. It was also considered that the beginning of such a movement by Poland would serve as an example which might well be followed by other European countries when returning to a sound money basis, and would naturally strengthen the price of silver in the American market, which would inevitably enure to the benefit of the silver producers, as such.

Among a number of seemingly unsurmountable difficulties which arose during the negotiations and which had to be solved, was the wish of the Government of Poland that the silver and alloy should be sold on credit, that the leading silver producers should furnish the silver and deliver the finished coins to the Government of Poland at Warsaw, accepting the promise of the Polish authorities for the ultimate payment of the amount of the purchase price of the finished coins at the point of delivery. While this is the first time the silver producers of this country have undertaken to

deliver finished coins to a foreign government, the difficulty in this connection arose because of the fact that a period of at least three months would lapse between the time of delivery of the silver to the U. S. Mint and the delivery of the coined zlotys to the Polish Government at Warsaw. The interest charge for that length of time is approximately 1 cent an ounce, and this loss had to be absorbed by the selling companies in order to consummate the contract. The burden of carrying this credit, approximately \$60,000, would fall upon those who undertook to finance this sale, while the benefits would accrue generally to the silver producers who took no part of this burden.

In the meantime a bank had been created in Poland with a paid up cash capital of 100,000,000 gold zlotys (a zloty is the new monetary unit of Poland having a value of 19.3 cents U. S. gold), and in various other ways the Polish Government had justified general confidence in its stability.

After a number of conferences an agreement was reached between the Anaconda Copper Mining Company, the American Smelting & Refining Company, the U. S. Smelting, Refining & Mining Company and the American Metal Company, by which these four companies undertook to assume the extra burden of this financing and two contracts have been made by them with the Government of Poland under the provisions of which they will furnish approximately six million ounces of silver and the requisite amount of copper. And in these contracts provision is also made for the delivery of the metals to the United States Mint, which is to manufacture them into Polish zloty coins of the stipulated denominations totaling 48,000,000 zlotys, and for the delivery of these finished coins by the silver producers to the Government of Poland at Warsaw.

In themselves these transactions are important, but the greatest importance must be attached to the fact that this is the opening wedge in the general use of silver in the subsidiary coinage of European countries.

The successful progress of this movement is in line with the contention of the American Mining Congress from the beginning that the only solution of the silver question lies in bringing about the return of the use of silver in those countries which, during the war, when the bullion value of silver was in excess of the face value of its coin, melted their coin and turned the silver into the markets of the world, thus establishing a gold credit abroad which enabled them to function in their war efforts.

The Silver Committee of the American Mining Congress is entitled to the lasting thanks of the silver industry for the accomplishment of this most practical effort for the development of a new market which will insure the stabilization of the silver industry.

BENEVOLENT DESPOTS

IN the days that are constitutionally gone, an Irish gentleman was riding in a Chicago street car. He had, as Shakespeare put it, "put an enemy into his mouth to steal his brain away." Even so, he was still capable of this piece of philosophy:

"I'm telling yez that there are more people a-hating each ither fer th' love of God than f'r all ither purposes put t'gether."

So, it seems, you can't always take a man's word for the purpose which is hidden behind his conduct. There is the Facisti of Italy for example. It came into power for the expressed purpose of saving the people from the despotism of the mob. It proceeded to set up

a despotism of one man. It was a "benevolent despotism," as the saying goes. It erred against the liberties of the people in order to protect, as it said, the liberties of the people. And then, in the end, one reformer pulled a dagger and struck down a protestant against the "reform." They did exactly the same thing that had been done by those whom they had ousted from power.

We of America have needed that lesson. We have, frequently, been offered the opportunity to accept "benevolent despotism" as a way out of situations which are temporarily annoying. It is a proper warning to learn that the nature of benevolent despots—meaning human nature—has not changed materially in a century or two. Absolute power—which means more power than frail human nature can safely be trusted with—quickly develops that weakness which resorts to violence if any opposition arises.

THE MYSTERY OF COAL

COAL is opaque—densely opaque. This may be the reason why the public, in its view of the coal business, believes that it must see through coal and failing to do this, cannot understand that coal is no different from any other commodity which, by continued and practically universal use, has come to be regarded as a necessity.

The ownership of the coal mines is divided among more than 15,000 separate individuals. To each of these individuals that property is absolutely worthless except as he can sell its product at a price which will allow him a few cents a ton for the coal itself plus the cost of mining and marketing. Aside from the small amount which he may need for his own uses coal has no value to its owner except as he can sell it at a satisfactory price.

Aside from the small amount of wheat which the farmer can use his wheat crop has no possible value to him except as he can sell it at a satisfactory price. When there is a surplus of wheat in the market the price goes down—when there is a scarcity the price goes up. The difference between coal and wheat is that wheat is an annual crop and when this year's wheat fails to find a profitable market the farmer can control his output for the following year and can utilize his land for the production of some other crop. Another difference lies in the fact that the wheat farmer under the most favorable conditions can only produce a few percent more than the market requirements of the current year.

All of the world's supply of coal for present and future generations is now in existence, owned by somebody. That part which is owned by the 15,000 coal owners is subject to taxation. These mines are able to produce at least 50 percent more coal than can possibly be consumed. Competition between these coal producers if not interfered with will necessarily be such as to furnish coal at a very low price.

Yet in the face of these conditions some sections of this country are facing a shortage of coal next year; coal at the mine and coal in the consumers bin are two different things. Between these points there is a difference of hundreds of miles. The railroads of the country are abundantly equipped to carry this coal from the mine to the consumer in an orderly way, yet the consumer expects the whole year's supply to be delivered to him in December—he is expecting the railroads to perform twelve times their service for which they are normally equipped, during that month.

Just now the consumers of coal are looking at the coal problem as if it were a lump of coal through which their vision is entirely unable to penetrate. This is called the coal problem—as a matter of fact the coal problem is largely a matter of stupidity on the part of coal users who refuse to buy their coal in an orderly way at a time when the mine can produce most cheaply and the railroads transport most easily.

The real coal problem lies mainly in the density and stupidity of the coal consumers mentality. At this time he is doing everything in his power to create conditions concerning which he will howl to high heaven and bombard Congress for relief from a condition which he is now deliberately creating. The ordinary business of the country requires the use of approximately the average of 10,000,000 tons of coal per week, throughout the year. Since April 1, 1924, about 7,500,000 tons per week have been produced and put upon the market—there is now developing a shortage of 2½ million tons a week, or ten million tons per month, which, if continued for two or three months more will certainly result in a coal shortage and higher prices.

This is not a coal problem—it is a problem of the consuming public. Coal is not very different from all other commodities which are needed for the public use. The problem is a problem of merchandizing, not of mining. Given an intelligent coal consuming public, a proper merchandizing system, and the so-called coal problem will become non-existent.

THAT INDEPENDENT TAX BOARD?

THE 1924 Revenue Act contains the following provision for the creation of a Board of Tax Appeals before which taxpayers could appear and secure a disinterested and unprejudiced determination of their tax liabilities:

"Sec. 900. (a) There is hereby established a board to be known as the Board of Tax Appeals * * *. The board shall be composed of seven members, except that for a period of two years after the enactment of this act the board shall be composed of such number of members, not more than twenty-eight, as the President determines to be necessary. (b) Each member of the board shall be appointed by the President, by and with the advice and consent of the Senate, solely on the grounds of fitness to perform the duties of the office. * * * (k) * * * The board shall be an independent agency in the executive branch of the government."

This board is now being organized. Twelve members have been appointed. Seven of the twelve were former employees of the Treasury Department. All of the twelve were approved and recommended by the department. They were called together by Acting Secretary of the Treasury Winston, from whom they received advice and instructions. Mr. Winston recommended the selection of Mr. Charles P. Hamel, chairman of the Committee on Appeals and Review, as chairman of the board. Mr. Hamel was elected.

Mr. Winston told the board that the government must have taxes; that receipts from alleged back taxes, from which appeals will be taken, were averaging between \$30,000,000 and \$40,000,000 a month; that unless the board acted with fairness to the government, apparently meaning that receipts from back taxes must not be curtailed by decisions in favor of the taxpayer, revenues would not be sufficient to carry the Treasury through the next fiscal year since estimated receipts include prospective large additional collections of back taxes.

Where is the independent agency that Congress said should be created?



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The Great Falls of the Potomac—15 Miles Above Washington

*"Beautiful, sublime, and glorious;
Wild, majestic, foaming, free,—
Over time itself victorious,
Image of eternity!"*

REVENUE BUREAU CHANGES AFFECT MINING INDUSTRY

Natural Resources Audit Division Abolished—Appeals Committees Form New Review Division Of Solicitor's Office—Board Of Tax Appeals Organized

THE natural resources audit division of the income tax unit, Bureau of Internal Revenue, has been abolished and its work and auditing personnel transferred to the consolidated returns, corporation, personal and special assessment divisions.

Commissioner of Internal Revenue Blair announced that greater economy and efficiency in operation will be secured through the change, which also involved the transfer of the engineering division to the same building in which the audit work is conducted.

The valuation problems of the natural resources industries will continue to receive the specialized consideration of the engineering division, according to Commissioner Blair, who asserts that once a valuation has been made, the determination of tax liability is no different in a natural resource industry than in any other industry.

CHANGE NOT FAVORED

The Commissioner's views are not in harmony with the views of leading members of the accounting profession who specialize in accounting for natural resources enterprises, including mine, oil and timber. Many of these specialists, among whom are members of the American Mining Congress general tax committee, are of the opinion that the auditing of natural resources cases can be accomplished with greater accuracy and facility by a natural resources division and close cooperation of the auditors with the engineers who know the properties. The wisdom of the change will, however, be demonstrated very soon.

Those who fear that the change will not help either the government or the taxpayer base their judgment on the fact that accounting procedure in the case of mines and other natural resources differs very materially from accounting procedure in other industries and enterprises. Ordinary fixed accounting rules will not apply to the mining industry.

MINE ACCOUNTING DIFFERENT

Wade Kurtz, in his address on "Profit in Mining Ventures," delivered at the conference on mine taxation held in Milwaukee, Wis., 1923, summed the situation up as follows:

"The fundamental principles inherent in the mining industry are different from other enterprises; the entire life of a mine is the only correct accounting period; the interim computation of profits are only estimates; and large interim profits or losses should be leveled by liberal accounting methods and common sense."

By MCK. W. KRIEGH

Mine accounting involves many uncertain and variable factors. A revenue auditor who is unfamiliar with these factors, the specialized principles of mine accounting, and the conditions affecting the operation of mines and other wasting resources, may be expected to apply erroneous rules in the determination of statutory net income.

The Commissioner of Internal Revenue has stated that the audit work on natural resources cases will continue in the hands of experienced mine accountants of the former natural resources audit division. But these men cannot be expected to remain at the low salaries paid by the government when more attractive positions await them outside. The abolishment of the natural resources audit division unquestionably will cause a very considerable turnover in personnel where highly specialized auditors will be supplanted by new, youthful and inexperienced men.

PRELIMINARY APPEALS

A division to be known as the Review Division has been created in the Office of the Solicitor of Internal Revenue. The members of the Committee on Appeals and Review and the members of the Special Committee on Appeals and Review, together with their assistants and other employees connected with their respective offices, have been transferred to that division.

All cases in which appeals have been taken under the provisions of Section 250 (d) of the Revenue Act of 1921 and which are now pending either before the Committee on Appeals and Review or the Special Committee on Appeals have been transferred to the Solicitor of Internal Revenue. The Solicitor of Internal Revenue will consider all such cases and submit his recommendations to the Commissioner, and the taxpayer will be notified by registered mail of the Commissioner's final determination, from which an appeal may be taken to the Board of Tax Appeals as provided by law.

FAILURE TO AGREE

If the income tax unit and the taxpayer are unable to reach an agreement respecting the amount of the deficiency, or if the taxpayer files a protest but fails to request a conference before the income tax unit, and the unit upon examination of the data submitted by the taxpayer does not agree with his contentions, the letter of protest, together with the files of the case, will be transmitted

by the income tax unit to the Solicitor of Internal Revenue for consideration and for hearing, if requested, accompanied by a letter of transmittal.

Opportunity for a hearing before the Solicitor of Internal Revenue, or before such representative of his office as he may designate, will be granted if requested in the letter of protest or within twenty days after the mailing of the transmittal letter. The Solicitor of Internal Revenue after consideration of the case will submit his recommendations to the Commissioner and the taxpayer will be notified by registered mail of the Commissioner's final determination.

FINAL APPEAL

Under the provisions of the Revenue Act of 1924, in the case of any taxpayer, an appeal may be taken to the Board of Tax Appeals from any final determination made after June 2, 1924, by the Commissioner of Internal Revenue that there is a deficiency in respect of the income tax imposed by the Revenue Act of 1924 or in respect of the income, war profits or excess profits taxes imposed by the Revenue Act of 1916, the Revenue Act of 1917, the Revenue Act of 1918, or the Revenue Act of 1921, or by any such act as amended.

In every case where a deficiency appears to exist, the taxpayer will be notified by a letter and will be afforded an opportunity to be heard within the bureau prior to the final determination by the Commissioner. Thirty days from the mailing (not the receipt) of the letter of notification will be given the taxpayer within which to present a protest against the proposed assessment.

If the taxpayer presents no protest within thirty days from the date of the letter advising of the deficiency, final determination shall be made, and the taxpayer will be notified thereof by registered mail. Within sixty days after the mailing of a registered letter advising of a final determination by the Commissioner the taxpayer may file an appeal with the Board of Tax Appeals. If in any case the taxpayer acquiesces in the tentative or final determination of the deficiency, or any part thereof, the form of agreement consenting to assessment, which will be forwarded with the letter of notification, should be executed and returned to the Commissioner.

BOARD OF TAX APPEALS

Twelve members of the Board of Tax Appeals appointed by President Coolidge in accordance with the provisions of the Revenue Act of 1924 will organize immediately. The act provides that the board

shall consist of seven members "except that for a period of two years after the enactment of this act the board shall be composed of such members, not more than twenty-eight, as the President determines to be necessary." It is probable the remaining members of the board will be appointed in the fall.

Of the twelve members whose appointments have been announced, seven—Adolphus E. Graupner of San Francisco, Calif., J. S. Y. Ivins of New York City, A. E. James of New Jersey, John M. Sternhagen of Chicago, Ill., Sumner L. Trussell of Minneapolis, Minn., John J. Marquette of Washington, D. C., and W. C. Lansdon of Salina, Kans.—were selected from the general public. Five—Charles D. Hamel of Grafton, N. D., Benjamin H. Littleton of Nashville, Tenn., Jules Gilmer Korner, Jr., of Winston-Salem, N. C., Charles P. Smith of Boston, Mass., and Charles M. Trammell of Lakeland, Fla.—were appointed from the personnel of the Bureau of Internal Revenue.

FUNCTIONS OUTLINED

In welcoming the newly constituted board, Acting Secretary of the Treasury Winston outlined the reasons for the creation of this body and summarized its purposes and functions. Mr. Winston said in part:

"Under the practice of determining and assessing additional taxes prior to the Revenue Act of 1924, there were certain fundamental defects which sometimes led the public to feel it did not receive unprejudiced and equitable treatment. It is to be remembered we have only to do with additional taxes. There is no hardship on the original tax prepared by the taxpayer himself. He knows what it will be and is prepared accordingly.

"Under the law a tax once assessed had to be paid by the taxpayer and then his remedy was to sue for its recovery. He must first find the cash for a liability for which he may not have provided. This had to be so, for to permit the taxpayer to try out the question of the validity of the tax through an injunction against its collection might so seriously handicap the general collection of taxes as to menace the revenues of the government.

"The first interest of all of the people is, of course, that the government continue to function, and to do this it must have the means of prompt collection of the necessary supplies to keep it going, that is, taxes. The method was, therefore, the determination by the Commissioner of the amount of tax due, its collection and suit to recover. The Commissioner personally could not pass upon all questions, and there was created in the bureau machinery for determining for him the tax liability.

DEFECTS IN ADMINISTRATION

"In clear cases there was perhaps no cause of complaint, but on doubtful questions the decision would normally go against the taxpayer, for two reasons—first, the employe of the bureau in passing on the case would be inclined unconsciously to give the shade to his employer, the bureau, and, second, and the principal reason, if a decision was against the collection of the tax the question could never be raised in court. It is obvious that the Commissioner could not go into court to collect a tax he had decided was not due. He or his machinery must decide in the government's favor and let the taxpayer pay and sue to recover in order that the courts pass on a doubtful point of law.

"To correct these defects the suggestion was made by the Treasury and embodied in the Revenue Act of 1924 of the creation of an independent board before whom the taxpayer and the Treasury would each present its case. If the board should hold that no tax was due, the Commissioner was free to try out the question in the courts. If the board held that the tax was due, then an assessment could be levied and the taxpayer would have to pay the tax and sue for its recovery. This was fair enough because the taxpayer would have first had an unprejudiced determination of his liability.

"Your board, therefore, is an independent agency of the government in the same way as the Interstate Commerce Commission, the Federal Trade Commission, and others. You are not a part of the Treasury, although it should be to the interest of all that you work very closely with the Treasury. It will still be necessary for the bureau to have machinery for determination of tax liability before the case reaches your board at all. It is by such procedure only that many mutual misunderstandings between the government and the taxpayer can be cleared up, the points at issue brought out, and your board prevented from being utterly swamped by the cases which come before it.

BACK TAX RECEIPTS HEAVY

"For the next few years back taxes are a very material part of the government's receipts. During the last fiscal year they probably ran as high as \$400,000,000. We were averaging between \$30,000,000 and \$40,000,000 a month when the Revenue Act of 1924 was passed. In June our receipts from this source dropped to \$3,000,000. You can readily see, therefore, that unless your board acts with promptness and with fairness to the government, our revenues will not be sufficient to carry us through the next fiscal year, the surplus of which is now estimated at under \$50,000,000."

At the board's first meeting Charles D. Hamel, former chairman of the Committee on Appeals and Review, was elected chairman. The board is now preparing regulations to govern its procedure and will soon begin to function. All hearings before the board will be public and the board's records will constitute public records.

ANTIMONY IN 1923

THE antimony market in the United States made a notable improvement in 1923, according to statistics compiled by the Geological Survey. The average price of antimony in 1923 was 7.81 cents a pound, as compared with 5.42 cents in 1922. Nevertheless very little antimony ore was produced from domestic deposits in 1923, and most owners of the deposits report that they can not profitably mine antimony ore unless the price of the metal is about 20 cents a pound.

The smelter production of by-product antimonial lead was 14,190 tons, containing 2,170 tons of antimony. The recovery of secondary antimony from old alloys, scrap and dross, mostly at secondary smelters, was 8,021 tons, valued at \$1,252,800.

IMPORTS

The antimony imported in 1923 for consumption in the United States, according to the Bureau of Foreign and Domestic Commerce, consisted of antimony ore containing 1,047 tons of antimony; 835 tons of liquated antimony sulphide or matte; 6,763 tons of metallic antimony; and 2,277 tons of antimony oxides and other compounds.

The total or general imports consisted of 1,047 tons of antimony in ore and 7,813 tons of metallic antimony, making a total of 8,860 tons of metal, valued at \$762,790, as compared with 8,872 tons in 1922 valued at \$600,283.

Nearly 75 percent of the imports came from China. Considerable quantities were received from Mexico, the first since 1919; from Australia, the first since 1915; and from the Straits Settlements, the first ever received from there. The type metal imported in 1923 amounted to 3,677 tons.

EXPORTS AND STOCKS ON HAND

The foreign antimony exported in the form of matte or metal amounted to 8 tons. The stocks of antimony remaining in bonded warehouses at the end of the year were 688 tons, as compared with 506 tons at the end of 1922. There also remained in warehouse 3 tons of type metal. As the war stocks are now absorbed from the market the outlook for the antimony industry is more promising now than it has ever been at any time since the war.

GEOLOGIC DATA IN OTHER THAN COPPER MINES

A Discussion Of Present Practice In Mine Sampling, Recording Underground Geologic Data, And Methods Of Estimation Of Ore Reserves, With Suggestions For Standardization

By GUY N. BJORGE*

THE value of careful geologic study and mapping as an aid in ore hunting and the successful development of ore bodies is now quite generally recognized. But the systematic application of geology in ore hunting is still in its youth. The first department regularly established for the study and practical use of geology as an integral part of a mining operation was that of the Anaconda Copper Mining Company in 1900. The organization of similar departments by several of the larger mining companies, principally the copper mining companies, followed a few years later. The employment of the staff geologist or geologists in mines other than copper is more recent and even now it is not general. Without question the application of geology to the problems of exploration will continually increase and the advice of the geologist will be increasingly sought.

The methods of taking and recording geologic data have grown up somewhat independently at the various mines. At most mines the method in use is that introduced by the first geologist employed or a modification of that method. After a considerable amount of data has been collected, changing the method is usually costly, and as a result changes are not often made unless the old records are proved to be faulty. In spite of the independent development of methods there is some uniformity of practice. Such uniformity has resulted from the work of the United States Geological Survey which has been followed in a general way and from interchange of ideas through the description in the technical press of methods used at various mines. Free interchange of information regarding present practice and ideas of best practice should have beneficial results in improving and standardizing methods. This article will briefly review present practice at mines other than copper, as revealed by replies to the questionnaire of the Committee on Standardization of Methods of Mine Sampling: Methods of Recording Underground Geologic Data and Methods of Estimation of Ore Reserves, Metal Branch of the Standardization Division of the American Mining Congress, supplemented by the writer's observation in numerous districts. The replies included nine from gold mining companies, seven from silver, silver-lead and lead mining companies, three from zinc mining companies and one from an iron mining

company. Unfortunately, the replies were, in many cases, incomplete and indefinite. The review of present practice cannot, therefore, be as complete as might be desired. It will also give the writer's ideas of best practice and it is hoped that these may bring forth free discussion and criticism.

As stated by Mr. Wilson, "The committee has, of course, no intention of attempting to dictate arbitrary, inflex-



Guy N. Bjorge

ible standards, but its recommendation will be in the form of composite opinion as to what constitutes the best practice from the methods employed by many of the more important mining companies."† Standardization of methods does not mean that the methods employed at every mine should be identical. For each ore deposit presents its own peculiar problems and any standardized practice must be sufficiently elastic to be adaptable to the varying conditions. Standardization, if properly applied, should mean greater efficiency and improvement and simplification of method. There is danger in carrying it too far. Dr. Charles W. Eliot, in a recent letter to the New York Times, pointed out that "standardization has become a danger-

ous adversary of progress in both education and industry." As geology applied to ore hunting is a relatively new profession, there is much room for improvement in its technique. Standardization should not, then, be carried so far that it will sacrifice individuality and initiative or hinder experimentation that may develop new and better methods. The aim in present work should be to utilize the best methods of present-day practice but to be ever ready to test new methods and to adopt them when proved better than the old.

While this discussion is intended to apply especially to mines other than copper, that distinction can be made only in reviewing present practice as evidenced by the questionnaire replies. For the differences in what may be regarded as best practice is not dependent on the particular metal mined but rather on the type of ore body or on the size of the mine or scale of operations if one company operates several mines. For example, the organization and personnel of the geological department will, in general, depend on the size of the mine or the scale of operations if one company operates several mines. But it will also be influenced by the type of deposit. Thus, the mining company having a uniformly disseminated ore deposit with, say, 100,000,000 tons of developed ore will have no economic reason for maintaining a permanent geological department. It cannot possibly have the same interest in applied geology as the company having an irregular replacement deposit in limestone with developed ore reserves equivalent to one, two or three years' production. And further, the functions of the geological department will depend on the type of ore deposit, irrespective of the principal metal. Thus, geologic mapping of stopes is essential in a complex and irregular deposit and quite superfluous in a simple vein deposit.

ORGANIZATION AND PERSONNEL OF THE GEOLOGICAL DEPARTMENT

As previously stated, the regularly organized geological department is more generally an integral part of the mine organization at copper mines, excepting, of course, the disseminated type, than at the mines of other metals. Twenty questionnaire replies received from other than copper mines give the following regarding the organization of geologic work:

Maintain separate geological department 5

* Consulting Mining Geologist.

† Third Standardization Bulletin of the American Mining Congress. Progress Report of Committee; page 1.3.

| | |
|--|---|
| One geologist in the engineering department | 3 |
| Some geologic data collected by the engineer | 3 |
| Consulting geologist makes occasional visit | 2 |
| Consulting geologist with local assistant | 2 |
| No geological work | 3 |

The staff geologist is less common at the gold, silver, lead and zinc mines than at the copper mines because in most cases operations are on a smaller scale and the amount of work in many cases is not sufficient to warrant the employment of a full-time geologist. But careful geologic work is proportionately just as important to the small mine as to the large one. The question, then, is how to organize the geological work for the most effective results without excessive cost.

The proper organization of the work and personnel of the department will be largely dependent on the scale of operations. It will be influenced also by the type of deposit. Following are suggestions for the proper personnel under differing conditions:

Class 1. Companies operating one property:

A. The small mine or prospect under development where the amount of work does not warrant the employment of a full-time geologist.

Consulting geologist to visit the mine at such intervals as the progress of the work demands.

B. The mine of moderate size with work requiring the full time services of a geologist or possibly a combined sampler-geologist but not large enough to attract or hold the capable and experienced geologist.

A full time geologist or combined sampler-geologist to take care of all routine work directed and advised by a consulting geologist visiting the property at such intervals as the progress of the work demands.

C. The large mine with sufficient work and variety of interest to attract and hold a capable, experienced geologist.

Full time Chief Geologist with such assistants as the work demands.

Class 2. Companies operating two or more properties.

A. The case in which such properties are small mines or prospects under development, none of which are large enough to maintain a local full time geologist.

Geologist visiting each of the properties at necessary intervals. Whether the geologist in this case will be employed for part time only or for full time or possibly full time with assistants will depend on the extent of the work.

B. The company operating several large mines each of which may need one or more full time geologists.

A Chief Geologist directing the work at all of the mines with such assistants at each mine as the work demands. If the interests of the company are very large and widespread a division into sectional departments with a Chief Geologist for each department may be desirable.

With some modification these can be made to fit almost any condition that may be met.

Another plan, and one that should be particularly appropriate for the smaller mines, is to have a joint department or a joint survey for several mines, possibly all in a district. There are districts in which no important commercial geologic work has been done where a broadly conceived economic survey of the district made jointly for the several companies should be of great benefit. This plan offers several difficulties. There may be conflicting interests under the apex law. Or, there may be conflicting interests in adjoining property not owned by the operating companies. If such difficulties could be adjusted, a joint district department or survey would almost certainly be of mutual benefit.

To whom should the geologist be responsible? Of the questionnaire replies that answer this question, seven report responsibility to the manager, one to the managing director, two to the mine superintendent and three to the chief engineer. There is, then, a majority for responsibility to the management. It is the opinion of the writer that the Chief Geologist (or the geologist, if there is only one) should be responsible for results to the management, but there should be close cooperation with the mine superintendent. He should, however, be relatively independent regarding his methods and what constitutes the essential work. In the case where a Chief Geologist directs the work at several mines or a Consulting Geologist is regularly retained, the local geologist will of course be guided by such Chief or Consulting Geologist.

SCOPE OF WORK OF THE GEOLOGICAL DEPARTMENT

The primary purpose in the employment of the geologist and the organization of the mine geological department is the assembling and utilization of data that may serve as a guide in future development. In this there is uniformity of practice. Beyond this there is great diversity in the scope of work of the geological departments. Only a few of the questionnaire replies were sufficiently specific in defining the scope of work or functions of the geological department to permit generalization regarding present practice. The following is a summary from the twenty

questionnaire replies hereinbefore discussed:

| | |
|--|----|
| Outside examinations | 10 |
| Authoritative supervision of development | 1 |
| Assist in planning and directing development | 9 |
| Originate development, in part at least | 5 |
| Merely keep a record | 6 |
| Approve all development work | 1 |
| Mapping stopes | 4 |
| Sampling | 3 |
| Ore estimating | 4 |
| Occasional chemical or microscopical investigation | 10 |

The functions of the geological department must, of necessity, be suited to the particular case. The essential thing is the guidance of exploration. This should include the duty of keeping a safe reserve ahead of development. To this end the first step is the collection and recording of all data bearing on the ore occurrence and the second step is the application of such data in planning new development. In many cases the geologist does not go beyond the first step. He merely collects and records the information and its application is left to the mine superintendent or mine foreman. This does not seem the best practice. For the geologist should be better qualified to sort the important from the unimportant in the mass of data collected and to apply the important data in planning new work than the superintendent who is concerned with all departments of operation. This presupposes that the geologist has sufficient ability, training and experience to permit of the delegation of a considerable part of the responsibility of planning and directing development to him. It is necessary that he be given such responsibility or the able, experienced man will not be attracted to, nor held in, staff work. To attract such a man the job must be made really interesting. The conditions that will hold such a man are well stated by Philip D. Wilson.* He says, in part:

"The ideal combination of attributes of a satisfying staff position from the psychological point of view would include enough responsible, local work to make home life possible with a happy admixture of enough work in other mines and districts to furnish mental stimulus. The geologist would thereby gain a wide knowledge of the vagaries of ore occurrence in many districts and incidentally avoid the intellectual stagnation and the resulting mediocrity inevitable to a routine job of long duration."

In addition to collecting and recording all information bearing on the ore occurrence and its application in planning and directing development work,

* *Economic Geology*; Vol. 16; page 554.

the scope of work should, whenever possible, include outside examinations.

Most of the well-known mining districts have been studied by the United States Geological Survey and the results published. This furnishes a basis for the work of the mine geologist. He must build from this, selecting the particular geologic features that have ore hunting significance, gathering and recording in convenient form for efficient use complete detailed information in the particular property or area with which he is concerned. In many cases the surface is already mapped in detail and the principal work is underground mapping. In nearly every case careful and detailed mapping of all development is essential. Geologic mapping of stopes is important only in the more complex and irregular deposits. But even in the more simple deposits it is well to map the first floor above the sill for this often yields more information than the level workings.

The scope of work of the geological department should, in most cases, include the direction of sampling and ore estimating. The assay record is essentially a part of the geological record. It should be kept in such a way that the relation of metal content to geology may be conveniently studied and interpreted. It must also supply the information daily demanded by the operating department.

In the uniformly disseminated deposit or the relatively simple vein the assay records will yield all information necessary to an accurate ore estimate. But in the more complex and irregular deposit the ability to make an intelligent estimate requires an intimate knowledge of the ore occurrence. In these cases the geologist is particularly qualified and the making of ore estimates should be one of his duties.

In addition to the guidance of exploration study of the geology, he may be useful in many other ways. Additional uses given in the questionnaire replies were as follows:

1. In planning the location of permanent openings such as haulageways, pump stations, etc., where their permanence and maintenance cost are dependent on the formation in which they are located or on other geologic features.
2. In selecting the mining method and laying out stoping sections in irregular deposits where these depend on an intimate knowledge of the ore occurrence.
3. In locating rock quarries for road and structural purposes.
4. In locating limestone deposits for obtaining lime for cyanide plants.
5. In locating coal deposits.
6. In locating building sites on barren ground.

7. In planning location of new shafts.

Comprehensive microscopical and chemical investigations are not often made by the mine geological departments. Of the twenty mining companies whose questionnaire replies were studied by the writer, ten include microscopical and chemical investigation in their geologic work but eight of these do only a limited amount. Chemical investigation in this discussion means work beyond the usual ore analysis.

Exhaustive microscopical and chemical investigations really belong in the field of research rather than applied geology. Such work is appropriate for the mine geological department first, as a special study at the inception of an important survey in a district where the problems of ore localization are imperfectly understood, and second, as con-



The Bunker Hill & Sullivan Smelter (Lead) at Kellogg-Wardner, Idaho

tinued study in the case where fine distinction between closely similar rocks is necessary or where there is daily need for closer identification of mineral association than is possible with the naked eye or hand lens. In general, the "applier" will use the microscope or the chemical analyses in the daily routine of work for specific purposes that results of more thorough investigation have proved to be important.

But occasional studies are, in almost every case, essential to a full understanding of the geology and ore occurrence. The necessary chemical work can usually be done in the mine laboratory. Unless the local department is large enough to include one man who is an expert with the microscope it is better to send specimens to the specialist for study. For microscopic work requires constant practice for proficiency in distinguishing the delicate color differences, etc., and in general the field geologist cannot devote enough time to it to become or remain expert. In most cases, then, when some problem is worth microscopic study it is better to collect a representative suite of specimens for study by a specialist.

A binocular microscope would, however, be a valuable addition to the equipment of every geological department. It is simple to use, requires no laborious preparation of specimens and gives satisfactory results for many purposes. The study of many specimens under the binocular microscope will also improve a man's observation in the field.

THE RECORD. TAKING AND RECORDING NOTES

The first step in the work of the geologist is the collection of all available information bearing on the geology and ore occurrence and the recording of that information in convenient form for efficient use. Geologic maps serve this purpose. They constitute the geologic record and may be called the geologist's "work bench." Their purpose should be to give complete data as to the amount and value of developed ore and all information that may serve as a guide for future development.

A complete and accurate map of the surface is essential except in cases where the surface is wholly covered by post ore formations. All the information that the surface may yield under close study should be recorded on a map in order that it may be available for correlation with the underground workings. The principal work of the mine geologist is, however, underground because the surface, once completely mapped,

does not continually supply new information. For this reason discussion of the methods of surface mapping will be omitted.

The methods of taking and recording underground geologic data vary greatly in detail at the various mines. This discussion will be concerned chiefly with the more important differences. The method of actually plotting the geology on maps underground is in every case preferred to the more laborious and less effective method of plotting the geology on the maps in the office from voluminous notes taken underground. No improvement on this method has been suggested. The loose leaf notebook is apparently generally adopted. It has several advantages over the bound notebook, chief of which are, (1) it permits of systematic filing of the notes and (2) it makes it possible to sort out and carry underground all notes relating to the particular part of a mine that is to be visited in a day's work. Several kinds of loose leaf books are used. The principal ones are the usual ring books, specially made leather or oil cloth folders and spring back metal covers. The writer prefers the spring back aluminum cover. It is light, compact, not affected

by water, and the rigid cover makes an effective "table" for note taking. The desirable size will depend somewhat on the scale of the map and the area to be mapped. The size that will hold a standard letter size sheet, 8½ inches by 11 inches, without folding is convenient when mapping large areas of level workings. It is, however, somewhat cumbersome and a cover approximately 9 inches by 6 inches that will take the letter size sheet folded once is more convenient in most cases. This is, however, wholly a matter of individual choice.

In mapping old working, i. e., workings that are surveyed and plotted on the mine maps, white prints (preferably on cloth) either cut in sections or folded to fit the notebook are most desirable. In bringing up the new work they do not serve so well. For the geology must in most cases be mapped before the workings are surveyed. This is necessary, both because the operator wants the information promptly and because important information may be obscured by close timbering. In bringing up new work it is, then, more convenient to use cross section paper, sketching in the workings with sufficient accuracy to permit accurate plotting on the office map as soon as the work has been surveyed and plotted.

The desirable scale for underground note taking is not the same for every case. It will depend on the amount of detail that must go on the map. The questionnaire replies give scales of 10, 20, 30, 40, 50 and 100 feet to the inch. There is, then, little uniformity in practice. A moderately large scale is desirable but with a scale as large as 10 feet to the inch there is danger of becoming lost in the maze of detail and losing perspective. For most cases a scale of 50 feet to the inch is satisfactory for general mapping with a larger scale for particular places where the detail is especially complicated. Correct detail in such places is often very important. The scale must of course correspond to that of the mine maps. Careful mapping should come immediately after the ground is opened. This is necessary because important facts may later be obscured by close timbering or guniting. And, furthermore, unnecessary work may be saved by changing the plan of development because of new information or by stopping work immediately the objective has been reached.

The twenty questionnaire replies referred to above are equally divided as to whether all workings should be mapped in strict detail or only important features noted. The answers were as follows:

All workings mapped in strict detail...9
Only important features noted9
Not answered2

The writer believes that there is little danger of loading the map with too much detail. This refers to the working maps. For special purposes prints of these maps may be made and on these such features as appear at the time to be significant may be emphasized. Mapping should, of course, center on the important features, that is, the features that are definitely applicable to the problem of finding ore. But these are not often definitely known. It is only after all details have been mapped, correlated and studied that they may be selected. And features which today apparently have little significance may with tomorrow's development or with advance in the technique of ore hunting prove important. The workings should, therefore, be mapped in strict detail.

Replies to the question as to whether written notes are copious or brief were as follows:

Copious 5
Brief10
Not answered 5

There is some doubt as to whether the question was interpreted as meaning written notes on the maps or apart from the maps. In detailed mapping it is necessary that notes be copious but they should, whenever possible, go directly on the maps. Written notes apart from the maps will too often be filed away and possibly forgotten. The maps, on the other hand are in constant use. By the use of abbreviations, conventions and symbols practically all of the necessary information can be placed directly on the maps. The writer uses a list of over a hundred abbreviations for rock and mineral names, colors, descriptive words and phrases, etc., which makes it possible to put many notes on the map without making it unduly complicated. This list will not be given here for a new list comprising the best of all submitted in the questionnaire replies will be included in the report of the committee.

In underground note taking two colors are quite generally used. These are red for vein material and blue for faulting. All other data is usually recorded by notes and properly indicated on the office maps by colors or conventions.

The next step after the underground mapping is the transfer of the information to the working maps. The working map should be a record of *observed facts* only. They should be complete, accurate and wholly intelligible, not alone to the man who makes them, but to others. That is, there should be a complete legend of all symbols, conventions and abbreviations. For, their use nearly always outlasts the tenure of one man and the record should be such that all the information may be utilized when a new man takes up the work. In this the

standardization of all symbols, conventions and abbreviations can be of great benefit.

The size and scale of the working maps must, of course, fit the particular case. In most cases the scale should not be smaller than 50 feet to the inch. For large mines the maps will have to be made in sections for convenience in handling. Sizes between 20 inches by 30 inches and 30 inches by 40 inches are convenient. Such maps are most serviceable when prepared on tracing cloth one level to a sheet. Composite geologic maps are invariably confusing. The several level sheets should register perfectly with each other for ease in correlation from level to level by placing the sheets one above the other.

In addition to the working maps on a fairly large scale it is usually desirable to have reductions of these to a scale of 100 or possibly 200 feet to the inch. In some cases even a greater reduction may be desirable. These make it possible to show a much larger area, sometimes the whole mine, or the entire district, on one sheet without making it too large to be convenient. They are effective in correlation of features over a larger area and in giving a general perspective of the geology.

Next in importance are vertical sections, both cross sections and longitudinal sections. Practically all of the observed facts are recorded on the plan maps. The sections, to be at all complete, must show more than the facts that can actually be observed in workings cutting the plane of the section. There is need for a certain amount of projection unto the plane of the section. But, there should be clear distinction between data from workings that cut, or are very near, the plane of the section and that which is projected from workings farther away. Sections are most effective in correlation from level to level and from the surface to the underground workings. They should, of course, be made on the same scale as the level maps but whether on the scale of the working maps or the smaller scale maps will depend on the amount of detail that must be shown. The number and position of sections that are desirable can only be determined after study of the data on the level maps. In most cases at least one longitudinal section and cross sections at fairly close intervals, possibly every 100 feet, are desirable.

All geologic features must be shown on the office maps by colors, conventions, symbols and notes. The aim in selecting the color scheme, or set of conventions should be to make the maps as easily read as possible. For this, the use of colors for the various rock formations has an advantage over inked conventions. Colors also have an advantage

in that they can be applied much more easily and quickly than the inked conventions. The latter are desirable only when numerous prints are required for they then save the work of coloring the prints. The colors used will depend on the number and variety of formations that must be shown. The United States Geological Survey uses a color scheme based on the age of the formation with a special color for each system. Another method is to assign certain colors to certain classes of rock. In many cases this proves more satisfactory. The writer has used the following color scheme with variations to suit particular conditions:

Limestone—Blue and purple.

Sandstone and Quartzite—Brown and yellow.

Shale—Pink.

Conglomerate—Yellow and orange.

Igneous rocks—Red for the more acid and green for the more basic rock.

Schist—Brown.

The method of showing intensity and commercial value of mineralization must be such as to clearly show the relation of mineralization to the geology. It may be shown exactly by recording assays on the geologic maps or on assay maps (on tracing cloth) that register perfectly with the working geologic maps which may be placed over the geologic maps. The relation of ore bodies to the geology can often be more clearly shown graphically. Thus, the ore may be indicated directly on the geologic map by cross hatching in ink using various colors to indicate grade between specific limits.

As stated hereinbefore, the working maps should show observed facts only. If they go further than this there is danger of confusing fact with theory. For the purpose of developing special problems or working out theories white prints of the working maps are most satisfactory. On these certain features that are regarded as of particular significance may be emphasized. When these have served their purpose they can be discarded or, if of possible future value, filed. The working maps, then, remain intact as a record of observed facts.

A majority of the companies whose questionnaire replies were studied by the writer use some kind of mine model. Most of them are glass models using horizontal glass plates to represent levels or vertical glass plates to represent sections. Such models have practical usefulness if properly made and kept up to date. The ability actually to visualize the mine in three dimensions may bring out things that are otherwise obscure. Whether the level or section model

is better will depend somewhat on the type of deposit but in most cases the section model is preferable for correlation from level to level and from the surface to the underground workings.

Representative rock and mineral specimens are often valuable in refreshing one's memory of conditions in workings that have become inaccessible and for comparison with rocks and minerals encountered in new workings. These are also helpful in training a new man. Specimens should be systematically collected and labelled or indexed in such a way that the exact location of each specimen may be readily determined. In certain instances a set of specimens from a drill hole or from mine workings that are inaccessible may have great value. To be really valuable such a collection should be as nearly representative as possible. In most cases the tendency is to collect the unusual, i. e., the rare and beautiful specimens rather than the ordinary or truly representative specimens. The rare specimen is of value for itself alone while the truly representative specimen is valuable because of that which it represents.

QUALIFICATIONS OF THE DESIRABLE MINE GEOLOGIST

The question "what qualities are desirable in a man for this work?" in the committee's questionnaire referred particularly to the work of routine mapping and the replies do not, therefore, adequately set forth the qualities desired in the mine geologist. But even with the limitation of the question to the work of routine mapping the replies were disappointing. For most of them enumerate only two or three qualities. One gave but a single quality and only one gave fairly complete qualifications requisite for the desirable man. Even for the work of routine mapping there are more than two or three desirable qualities. Furthermore, even though a man be engaged for the work of routine mapping he should have the qualities that would make him available for more responsible work when the opportunity

arrives. A composite of all replies follows:

| | |
|--|----|
| Total number of replies..... | 14 |
| Geologic training essential..... | 10 |
| Careful, accurate or keen observer.. | 10 |
| Open mind..... | 3 |
| Tact, diplomacy, or cooperation with operator..... | 3 |
| Accuracy..... | 2 |
| Good reasoner..... | 2 |
| Patience..... | 2 |
| Ability for detail work and study.... | 2 |
| Love of his profession..... | 2 |
| Thoroughness..... | 2 |
| Some ability..... | 1 |
| Painstaking attitude toward work... | 1 |
| Conscientiousness..... | 1 |
| Good draftsman..... | 1 |
| Underground experience..... | 1 |

Ten affirmative replies as against nine negative ones indicate an almost even division of opinion as to whether intensive geologic training is essential for efficient routine mapping. The writer believes that thorough training in geology is, in nearly every case, essential for effective work. Yet a capable man with a well-developed faculty for accurate observation may become efficient in routine mapping though he may have had only moderate training in geology if he has the opportunity of working under capable direction.

The writer considers the following qualities essential in the good mine geologist.

- a. Thorough training.
- b. Faculty of accurate observation.
- c. Economic viewpoint.
- d. Ability to cooperate with the operating department.
- e. Industry and common sense.
- f. Clear thinking and an open mind.
- g. Moderately good draftsmanship.

A man with these qualities will do effective work and will, when his experience is sufficiently broad, be qualified for important and responsible work.

Finally, the success of applied geology in mining will depend on the pointed and practical application of all possible geologic data—the use of all available tools—in the problem of ore hunting.



On the Mesabi Iron Range

The Interior Department will spend \$38,425,336 less during the fiscal year ending June 30, 1925, than it did during the fiscal year ending June 30, 1924, according to a tabulation of appropriations just completed at the Interior Department.

This reduction, one of the largest ever made in the history of the Department, represents a net saving, the total appropriations for all the bureaus of the Department in 1925 being \$290,493,724 as compared with \$327,591,440 in 1924.

ORE ESTIMATING IN MINES OTHER THAN COPPER

A Discussion Of The More Important Factors Involved In Ore Estimating—Methods Which Obtain At Progressive Properties May Be Considered "Standard"

By J. KRUTTSCHNITT, JR.*

THERE are those who still contend that standardization in the various branches of mining is impracticable, on the theory that each mine is a problem unto itself and therefore requires distinct and special treatment. If the meaning of standardization is taken literally and in a restricted sense, the contention of these "conscientious objectors" is tenable for many individual operations. However, the men who are serving on committees of the Standardization Division of the American Mining Congress have shown by their reports and writings that standardization in its broadest sense may mean the elimination of waste (and a greater uniformity of methods, practices, and policies in mine operation), by the wider application of scientific principles. The way in which a certain operation is carried on at a number of progressive properties reflects best practice and may thus be considered *standard*, even though it may have to be varied somewhat to fit some individual case. The basic principles of what is considered standard will, however, remain the same.

Among the more important factors involved in Ore Estimating may be mentioned:

1. A definite knowledge of the structural and economic geology of the ore deposit.
2. Thorough sampling data, with assay plans and sections.
3. Accurate measurements to be used as functions of volume.
4. A correct determination of the conversion factor for reducing cubical contents to tons.
5. Moisture content should be ascertained and estimate expressed in dry or wet tons.

The engineer who attempts to calculate tonnage without a knowledge of the structural geology of the deposit may, by overlooking faults, igneous intrusions, etc., make a costly blunder. In the Engineering and Mining Journal of July 18, 1914, Mr. Dwight E. Woodbridge presented a table of comparative estimates of Mesabe iron ore bodies by four engineers working separately. Had not these men been well posted on the structural and economic geology of the deposit the close check of the individual calculations would have been extremely unlikely. In this instance the estimators had to carefully consider the following: Ore

channels; short-line areas; method of drilling, whether churn or diamond; silica analyses of the drill-hole samples; rock inclusions in the ore, a varying factor for different parts of the range; a knowledge of mining conditions, etc.

There are districts, such for example as the Wisconsin lead and zinc region and the Lake Superior Copper Mines, where the behavior of the ore deposits is so well understood by experienced operators that ore estimates are predicated upon approximate delimitation of ore bodies by churn or diamond drilling and a more or less visual appraisal of the metal content. Thus in these instances empirical methods have become standard.

There is room for greater uniformity in the making of assay plans and sections which are to form the basis of an estimate of ore. Too often, it seems to me, one encounters assay plans on which the metal content per ton is posted in terms of dollars and cents instead of ounces for the precious metals and percentages for the base metals. In many cases the engineer(?) fails to give the unit prices used in converting metal content to gross value. This is misleading and frequently incorrect as values are included which cannot be realized.

Widely divergent opinions obtain with respect to the treatment of high assays in calculating the average content of spotty and erratic ore deposits. Much to be sure depends on the nature of the mineralization and the judgment of the estimator, but the principles involved are subject to some degree of standardization.

Arriving at the average assay is another step in the estimator's calculations which may be studied with the view of introducing greater uniformity of practice.

The separate tonnages or blocks into which the deposit is divided should be carefully classified by the engineer in a manner commensurate with their certainty of existence. The terminology used to thus classify ore varies somewhat, but the use of any one or a combination of the following terms is considered standard good practice:

Ore exposed on three or more sides: ore developed; ore available for extraction.

Ore exposed on one or two sides: ore being developed; probable ore.

Ore representing the mine's expectancy: expectant ore; possible ore.

An ore body which has been systematically explored and more or less delimited by diamond or churn drilling may be correctly designated in estimates as ore "indicated" by drilling, or ore reasonably assured by drilling. The intensity and completeness of the drilling campaign may be reflected in the choice of these terms.

The divisor used to convert cubical contents to tons is obtained in various ways, but is often guessed at. Specific gravity determinations on individual pieces of ore, unless performed on a great many specimens, lacks thoroughness. The method of filling with water the voids of a composite sample of the ore (suitably broken up for the purpose) and thereafter computing the volume of voids from the weight of the water has much in its favor to standardize it. Porosity is a rather troublesome item to determine, but if not considered may lead to serious error.

The forthcoming report of the Committee on Mine Sampling, Ore Estimating, etc., will attempt to point out ways and means of standardizing methods and policies in these important branches of metal mining.

Government Reports

Serial No. 2611: Fatalities in the California Oil Fields, by H. C. Miller.

Serial No. 2612: Effects of Extraneous Gas on the Production of Oil Wells in the Lyons-Quinn Field of Oklahoma, by M. J. Kirwan.

Serial No. 2613: Microchemical Analysis and Its Application in the Determination of Low-Grade Ores, by Ernest E. Fairbanks.

Serial No. 2614: Explosives Used in April, 1924, by W. W. Adams.

Serial No. 2615: Sand Blast Sand, by W. M. Weigel.

Serial No. 2616: Saving Gasoline and Increasing Mileage by Proper Carburetor Adjustment, by G. W. Jones and A. A. Straub.

Serial No. 2617: The Safety Bonus in Metal Mining, by F. C. Gregory.

Serial No. 2618: Hindered Settling Classification in Relation to Table Concentration of Idaho Lead-Zinc Ores, by A. W. Fahrenwald.

Serial No. 2619: The Effect of the Temperatures of Liquid Oxygen Explosives on Cordeau-Bickford, by D. B. Gawthrop.

Serial No. 2620: Coal Mine Fatalities in May, 1924, by W. W. Adams.

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STANDARDIZATION OF METHODS OF OBSERVING AND RECORDING GEOLOGIC DATA IN COPPER MINES

Uniformity Of Practice Highly Desirable—Standards Must Be Flexible—Academic Training Of Geologists Should Include Comprehensive Standards—Establishment Of Public Agency For Preservation Of Geological Maps And Records Urged

By LOUIS E. REBER, JR.*

THE most satisfactory practice in geological work for mining properties necessarily varies enormously depending on the character of the ore deposits and the scale of operation. While the best methods for mines producing copper differ to some extent from those for mines producing other metals, differences due to the type of the deposit are most fundamental. That is, a vein deposit producing copper may have more in common with a vein deposit producing gold than it has with a large schist replacement copper deposit.

Definite standards can only be established to apply to definite sets of conditions. These conditions are different in nearly every property. If the ore deposits are grouped according to types such as vein deposits, schist replacement deposits, limestone replacement deposits, irregular contact deposits, and disseminated deposits, it should be possible to establish a set of standards for each class sufficiently flexible to cover the varying conditions met with in each group. The standards for the different groups should have some features in common.

The development and publication of such a set of standards is only a small step toward bringing about any degree of uniformity in actual practice. Present practice varies widely; not only in regard to those features determined largely by the varying conditions inherent in the different types of ore deposits, but also in many details which vary by chance or due to causes incidental to the development of the work in a given property.

It is believed that uniformity of practice, with due regard to the various conditions met with, is much to be desired. Any standards sufficiently flexible to be generally applicable should also be susceptible to growth with little fundamental change with the future develop-

ment of the science of geology and its practical application to the finding and beneficiation of ore deposits. Thus, in this case, it should be possible to avoid the tendency to discourage progress which must always be guarded against in connection with standardization.

Uniformity of practice is, in itself, desirable, and certain concessions may be made purely for the sake of uniformity. However, uniformity is not sufficiently important to justify it at the expense of efficiency to any appreciable extent. There are many relatively unimportant minor details in connection with mine geological work which may be standardized to advantage, chiefly for the sake of uniformity.

The merits of any standards in so far as the more important features are concerned, depend on how accurately they embody the best practice as applied to any given conditions. The general adoption of standards should mean a material improvement in the efficiency of the work and the quality of the results. Thus, the most important uniformity sought is uniformity of excellence, with minor advantages in efficiency to be gained by a certain degree of uniformity as to details of practice.

With complete information as to the experience and practice developed to date, it should be possible to work out ideal standards. The actual attempt to determine such standards is necessarily based on less than complete information and handicapped by lack of time and facilities for study and research. Such unavoidable limitations render it uncertain whether the forthcoming Mining Congress Committee report dealing with this subject can embody recommendations as to standards of sufficient merit and general applicability to warrant their universal adoption. In any case, the attempt to utilize to this end the material available should lead to valu-

able results. The work of the committee, as well as the report, will call attention to the advantages to be gained by the exchange of information. Merely filling out the questionnaires sent out by the committee no doubt leads to a valuable analysis of practice and to suggestions for improvement in many instances. The information gained from a study and comparison of the returned questionnaires should be of general benefit and indicate possible improvements in practice. It should prove at least an important step toward the outlining of ideal standards such as described above.

With the establishment of such standards, their general adoption must necessarily be a very slow process. These standards would, no doubt, embody some features the advantages of which were sufficiently obvious to bring about immediate changes in some instances. Such features of the new standards as do not differ greatly from the established practice in a given instance or the advantages of which are subject to some differences of opinion will necessarily come into use very slowly in those properties where extensive geological work is being carried out and definite practice has already been established. Less important details, particularly in regard to conventional symbols and map representation, which should be standardized chiefly for the sake of uniformity, would be still slower of adoption where practice is already established.

As emphasized above, the fact must not be overlooked that standards as applied to geological work are primarily to aid in securing the best methods for any given occurrence. However, the advantages of as great uniformity of practice as consistent with efficiency are decidedly worth while.

It is believed that the academic training of men specializing in economic geology should include more information as to detailed practice in routine mine work than is commonly the case at pres-

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ent. The general recognition and adoption of standardized methods, or any step in that direction, should tend to simplify and encourage the adoption of this desirable feature in collegiate work. This should save some of the loss of time in breaking in beginners on mine work, as well as men who have had some experience at other properties. The general knowledge of comprehensive standards and their inclusion in academic training should be of material assistance in connection with the use of men with limited experience on occasional outside jobs differing from the routine mine work in which they are engaged. The incorporation of generally accepted methods into standard texts and handbooks should also prove of material assistance in this connection.

Standardized methods should greatly facilitate the appreciation and use of geological maps and records by engineers not in close touch with the carrying on of the work, and by consulting geologists. This is particularly important in connection with the records of abandoned and inaccessible mines and prospects as bearing on the possibilities of further work in a given neighborhood.

It is very desirable that some public or semi-public agency be established for the preservation of the geological maps and records of all mines and prospects, so that when such mines or prospects are abandoned and the records cease to be valuable as exclusive property, they may become general property. Records of this kind, many of which are entirely lost under present conditions, would be very valuable in connection with any consideration of future work in or near the abandoned properties, as well as preserve valuable data to aid in the development of the science of economic geology. If such records were kept according to standardized methods, their use would be greatly enhanced.

The varied conditions in mine geological work in various properties, as have been outlined above, makes the field a broad one. The work of establishing standards is difficult and involves the consideration of an enormous amount of material. Satisfactorily complete standards must be extensive and include a number of more or less distinct groups. The establishment of sufficiently comprehensive standards, of sufficient undisputed merit to warrant their general adoption, will probably require several years of development. When such standards have been sufficiently developed and accepted, their general adoption will no doubt be a very gradual process. It is believed that the eventual achievement of such standards is greatly to be desired, and that work leading to that end offers an important field for aiding progress in applied geology. Even if the final object

is not attained, any work to that end should prove worth while in furthering the development and utilization of improved methods. This holds for applied economic geology in general, as well as for the important subdivision embraced by mine geological work in the copper industry.

FULLER'S EARTH IN 1923

THE largest output on record of fuller's earth is reported by the Department of the Interior, through the Geological Survey working in cooperation with the State Surveys in Alabama, Florida, Georgia and Illinois. Fifteen operators in six states reported that 149,134 short tons of fuller's earth were sold in 1923, valued at \$2,247,523, or \$15.07 a ton. This output is 7 percent greater than that of 1922, but it is nearly four times the output of 1913. The value of the output for 1923 was the third largest that has ever been recorded, and was exceeded by that of 1920 and 1922. It was six times as large as that of 1913. Since 1920 there has been a steady decline in the average price per ton, the price in 1923 being nearly \$4.50 lower than that of 1920.

The South continues to produce the greater part of the output. Florida was the leading state in output and value, as it has been from the beginning of the industry. Georgia was second and Texas was third in output and value. These three states reported about 92 percent of the output and value in 1923. The producing states in the order of their output were Florida, Georgia, Texas, Illinois, Massachusetts, Alabama.

Imports of fuller's earth, which at one time constituted the entire supply, reached their maximum quantity in 1914; since then they have on the whole declined and reached their lowest quantity in more than 25 years, 8,547 tons. The value in 1923 was \$113,944, or \$13.33 a ton. The value of imported fuller's earth in 1923 was the lowest since 1909.

TO STUDY WOOD PRESERVING

THE American Mining Congress organized two years ago a section under its Standardization Division for the consideration of various phases of the subject of mine timbering. The committee has rendered two reports, both of which have attracted wide attention. An interesting phase of work was developed by George M. Hunt, chairman of the Committee on Wood Preserving. The reports of this committee have aroused mining companies to the great possible benefits and the large monetary saving by treating mine timbers to prevent their decay.

This interest now has extended to the

universities through the Mellon Institute of Industrial Research of the University of Pittsburgh, which has recently announced the founding of an industrial fellowship on the treatment of mine timbers. Dr. A. M. Howald will conduct the research, which is fostered by the Grasselli Chemical Company of Cleveland. Improvements in the methods of applying zinc chloride in wood preserving will be studied.

The University of Pittsburgh maintains an experimental wood impregnating plant for practical tests of processes under investigation.

As the preservation of mine timbers means a saving of millions of dollars annually to the coal industry and as the metal industry has been searching for many months a method of treating timbers that will preserve from decay and also reduce the fire hazard, the Mellon Institute is undertaking a work of great interest to the mining industry generally.

The Forest Products Laboratory at Madison, Wis., has also carried on experimental work along this line for several years.

Dr. C. M. Carson, professor of chemistry, Michigan College of Mines, has been appointed by the college board of control as acting president, until the vacancy caused by the untimely death of Dr. F. W. McNair can be filled. Dr. Carson is a graduate of the University of Toronto and the University of Chicago. He has been connected with the College of Mines since 1913.

GOLD, SILVER, COPPER AND LEAD IN TEXAS IN 1923

THE total value of the gold, silver, copper and lead produced from mines in Texas in 1923 was \$668,985, according to the Department of the Interior, as shown by figures compiled by C. W. Henderson of the Geological Survey. Silver totaled 811,824 fine ounces, gold \$802, copper 4,257 pounds, and lead 26,605 pounds. Some lead and some copper ore were shipped from El Paso and Hudspeth counties, but the output was mainly dry silver ore cyanided at the Presidio mine, Shafter, Presidio County.

SECONDARY METALS IN 1923

A RECENT report issued by the Department of the Interior, comprising statistics compiled by J. P. Dunlop of the Geological Survey, shows that in 1923 about 318,000 tons of the more valuable secondary metals—copper, lead, zinc, tin, antimony, aluminum and nickel—were recovered, and more than 515,000 tons of brass and other alloys. The value of the secondary metals was more than \$200,000,000.

ECONOMIC UTILIZATION OF NATURAL RESOURCES*

Natural Resources Classified Into Five Groups—No Special Necessity For Conservation Of Iron, Coal Or Nonmetallic Mineral Reserves—Shall Nonferrous Metals Be Conserved?—Failure To Open New Mines Due To Labor Costs, Taxation, Lack Of Consolidation Of Properties, Inability To Finance Exportable Surplus, And High Cost Transportation

By H. A. C. JENISON

NATURAL resources are readily divisible into five groups—timber, water-power, mineral fuels, metallic minerals and non-metallic minerals. The metallic minerals are readily divisible into two sub-divisions, ferrous and non-ferrous. This sub-division is a natural geologic and economic classification resulting from the difference in the use of the metals and the magnitude of the reserves.

Timber under a sensible policy of utilization is in reality a crop which is renewable. Water-power is a more or less constant quantity and under reasonable methods of utilization cannot only be conserved, but the available quantity can be materially increased.

The other three groups (the mineral groups) of natural resources are non-replaceable, non-renewable and are extremely limited in quantity. Though the reserves of iron, coal and the non-metallic minerals are vast in comparison with those of oil and the non-ferrous metals, they are nevertheless limited.

In view of the fact that these mineral reserves are limited, it is advisable to inquire into three fundamental questions: Are these minerals and metals necessary to our system of civilization and, if so, are these minerals and metals to be conserved or economically utilized?

The first of these questions is easily answered. Iron is the great structural material and is the body of transportation. Copper is the basis of telephonic, telegraphic communication and the basis of the generation and transmission of electric power. Lead and zinc are fundamental in the electrical, building and paint industries. Gold and silver are the world's media of commodity exchange. Coal and oil need no comment. The non-metallic minerals, though less conspicuous, are of fundamental importance.

The magnitude and the growth of the industry based upon these resources and the enormous sum which these natural resources

have contributed to the wealth and power of the United States, is indicated by the records of the United States Geological Survey and may be summarized as follows:

The total value of the products of mines, exclusive of metal manufacturers, for the period 1880 to 1900, inclusive, was about \$11,000,000,000, and for the period of 1901 to 1922, inclusive, about \$64,000,000,000, making a grand total for the entire period 1880 to 1922, inclusive, of about \$75,000,000,000, of which the metal mines contributed about \$30,000,000,000 and the non-metal mines, including mineral fuels, about \$45,000,000,000. It should be noted that the value of production in the second period, 1901-1922, inclusive, was nearly six times as great as it was in the preceding similar period. The non-ferrous metal industry alone contributed approximately one-half of the total value of the production from metal mines.

In 1920, which was not a very good year for the metal mining industry, the value of mineral production exclusive of all metal manufacturers was about \$7,000,000,000 while that of agricultural crops, according to the Department of Agriculture, was about \$11,000,000,000. In 1921 the value of mine products decreased to about \$4,139,000,000 and in 1922 was only about \$4,650,000,000. This great decrease was to a large extent due to the unfavorable conditions in the non-ferrous metal mining industry.

It is seldom realized, even by the mining industry, that the industrial growth and development of the United States has paralleled and been dependent upon the growth and development of the mining industry. The construction of the

first great trans-continental railways was the result of the discovery and development of the great non-ferrous metalliferous deposits of the West. The agricultural development of the central and western states was made possible by the development of the first of these transportation systems, the industries based upon metals and the manufacture of metallic farm machinery and mechanical transportation.

It is, therefore, obvious that the industrial strength, the prosperity, the military security of the United States rests primarily upon the mining industry. It would be impossible for the United States to successfully defend herself without her mining industry or any fundamental part thereof.

Consequently, it is essential in any wise, farsighted national policy to inquire into the character and future of this great industry.

In the first place it is based upon the utilization of assets (ore reserves) of a limited and non-replaceable or non-renewable character and in the second place, regardless of the quantity of mineral or metal bearing material, only such material as can be mined at a profit is ore reserves, that is, only profitable material is available to industry.

In view of the great quantity of iron ore reserves, non-metallic mineral reserves and coal, there is no immediate problem connected with either their conservation or utilization.

Consequently, the problem that the United States is facing at the moment is whether the non-ferrous metalliferous reserves should be conserved or economically utilized.

Few people realize that there is such a problem, since from the time of discovery of gold in California, until about

1910, the discovery of new high grade deposits and the development of great mines in the Central and Western States was a constant occurrence.

It is a noteworthy fact, however, that the discovery and development of large new mines in the United States since



U. S. Topographical Engineers in the Field

* Read at the Meeting of American Zinc Institute in St. Louis, Mo., April 29, 1924.

that time has been extremely limited. Consequently, the quantity of reserves under the present conditions is a subject of great importance.

If all the risks of the personal equation are eliminated from a mining venture, there remains the inherent physical risk of the deposit not containing as much or as high-grade ore as was reasonably expected. The market risk in the unorganized non-ferrous metal mining industry is greater than in any other, since the metal markets are the first to react to adverse economic conditions. Furthermore, often a sound and ultimately profitable mining venture may pay no return on a large investment for many years because of the several years required to bring a large mine to the producing stage, and the adverse market conditions which may prevail for several years after the mine has been prepared for production.

Therefore, ore reserves, to be ore reserves, must yield a certain minimum unit profit when mined which will (1) redeem the invested capital, (2) pay a return equal to that paid by investments of minimum risk, and in addition (3) compensate for the risk involved in a mining investment, and (4) compensate for or insure against a deference of dividends, or the industry is not being operated upon a sound basis, either from the point of view of sound economics or national conservation.

Consequently, whenever the spread between cost and selling price becomes less than the necessary minimum unit profit, such metalliferous material ceases to be reserves and the money invested in its development becomes a loss of capital. Therefore, if through any cause whatsoever the spread between cost and selling price becomes less than normal, there is a corresponding shrinkage or diminution of the known ore reserves of the Nation. When the spread becomes zero or negative, ore reserves vanish completely.

The quantity of non-ferrous metal-bearing material known to exist in the metalliferous deposits of the United States is large, but because of increasing per capita consumption of these metals under normal conditions, the actual ore reserves are of very limited life. The total quantity of proved, probable and possible reserves of the most abundant of the non-ferrous metals in the known deposits of the United States with a normal spread between cost and selling price is equivalent to no more than about a 25-year supply and the least abundant to about a ten-year supply at the normal rates of consumption.

At the present time the selling price of the metals, excepting lead, is about equal to, or below the pre-war average. As a result of these conditions, the

spread between cost and selling price has so greatly diminished, or in some cases become negative, that our known ore reserves have shrunk to a small fractional part of their pre-war magnitude, and the mining industry in order to avoid great shut-down losses is forced to resort to such uneconomic selective mining that much of the remaining metal-bearing material can never be mined under normal conditions, and is, therefore, a permanent loss of reserves.

The best interests of the Nation demand that capital invested in the development of its natural resources create new wealth, and unless the proper relation between cost and selling price is restored the present conditions must inevitably result in the waste of invested capital, the loss of developed ore reserves, a loss of taxes, potential unemployment, low standard of wages, and an imperiling of national safety, by bringing nearer the time of dependence of the United States upon foreign metal supplies.

Obviously, under such conditions it is necessary that these reserves be conserved or more economically utilized. Conservation in its strictest sense means restricting production and putting aside reserves for some future time. This is in the main a futile policy because ultimately these reserves must be exhausted in any case, or else serve no economic purpose, and in the meantime, if production is restricted to less than the demand, it works a great hardship upon industry.

It, therefore, follows that the wisest course to pursue is one of economic utilization. Economic utilization would inevitably result in every pound or ounce of metal mined, yielding the minimum unit profit necessary to the conservation of capital and the creation of new wealth which the work of labor and capital demands and deserves. Furthermore, it would truly conserve these limited assets by preventing the wasting of ore reserves which are not needed at this time, and which at present cannot be mined at a reasonable profit.

It is obvious that most of the high grade easily discoverable deposits are being mined or have been exhausted. Consequently, the industry is growing more and more dependent upon the low grade more inaccessible deposits which require great sums of capital to be made productive. The days of the individual small companies and the small high grade mines are rapidly nearing their end. It follows that it is only through conservation of the capital already invested in mines together with a reasonable interest thereon, that there will be the necessary capital forthcoming to find and develop the new reserves as they become necessary.

Under such conditions it seems rather an enigma that economic utilization instead of foolish wastefulness is not being practiced. Unfortunately, it is impossible to more economically utilize these metals until certain problems are solved, which partly through fault of the industry and partly through that of the government have been allowed to develop. These problems may be enumerated as follows:

1. The high cost and inefficiency of labor and the related immigration problem.
2. The great burden of Federal, State and local taxation.
3. The inability or the failure of mining companies to consolidate sufficiently to enable the industry more rapidly to adjust itself without loss to the extreme variations in demand.
4. The inability of the metal-mining industry of the United States to finance its exportable surplus and to carry the stocks of metals accumulated during period of excess production or diminished markets.
5. The inability of American producers so to cooperate with American and foreign producers in foreign countries as to meet the foreign competition of the strongly organized foreign selling agencies, and consumers.
6. The high cost of transportation.
7. The inability to secure for the metals a price comparable to the present general index of other commodities. At the present time the metals of the United States are being mined and sold in the main at prices which are so low that they will not purchase more than one-half to two-thirds of their equivalent worth in other commodities, as indicated by the pre-war price relations, notwithstanding the fact that the cost of practically everything which is used in mining has risen comparably to the rise in the general index.

The high cost and inefficiency of labor is most acute in the western states where labor is not indigenous nor immobile, but is very transient. In spite of the low metal prices the mine operators are forced to compete for labor with such industries as the railways and the prosperous automobile industry. As a result the wages are higher and efficiency lower.

In few camps is the unit productivity of labor as high as the pre-war standard and in all camps greater and greater use of power has been necessary to offset the decline in labor efficiency. Greater immigration is apparently the only solution of this problem and at present there seems to be no hope for increased immigration though the character of immigration will be greatly improved.

The second problem, that of high taxation, is difficult. The Federal Gov-

ernment's present policy of tax reduction may afford some relief but it is doubtful if the reduction will be very great and the equity with respect to the mining industry of the present system is open to question. So far as state and local taxation is concerned there can be no relief until the present orgy of state expenditures is over and the tax exempt bonds are a thing of the past.

The third problem, that of the failure or inability of the mining companies to combine and mining and fabricating industries to integrate is the great problem of the non-ferrous mining industry and one of the most difficult to solve. It is the primary and principal cause for present wasteful exhaustion of reserves.

In order to meet the war demands the productive capacity of existing mines and plants was greatly increased and new mines were opened up. The end of the war brought about a greatly diminished demand, and since the industry is essentially composed of many large and small independent companies without effective cooperation, the diminished demand necessarily has resulted in five years' wasteful competition. Each independent operator found it contrary to his interests to shut down while his competitors continued to operate. Concerted action was forbidden by law, but finally through irresistible economic pressure shut-downs were forced.

The operators are wiser now, particularly in zinc and copper industries which are operating in the main at reduced capacity. This condition, however, does not result in economic utilization but in waste. The cost of operation is higher at reduced capacity and the price of metals is kept at a wastefully low level by the excess productive capacity. So long as the capacity to produce is greater than the demand there can be no materially higher metal price without violation of law.

A slight increase in price is immediately followed by an increase in production unless there is a general agreement among all producers not to increase production.

There is not alone an absence of effective combination and cooperation among the various marketing units of the industry, but little or no cooperation among the mining, smelting and refining companies. In one district the miners have the upper hand, in another the smelter, but nowhere does it appear that either is inclined to allow the other a profit if it can be avoided, and the consumer has the upper hand of both. Both miner and smelter fail, apparently, to realize that unless each has some profit one is consuming rather than creating capital and must ultimately be eliminated to the disaster of both.

Obviously, without a greater market for metals than now exists loss of capital and waste of reserves must continue. Cooperation between the various units and elements in the industry is the only solution, the only means of economically utilizing these wasting assets.

There are various kinds and degrees of cooperation—first of which is the voluntary sort—such as the American Zinc Institute. It does splendid work in speaking for the industry, increasing markets, advising its members, but its activities are necessarily limited because it cannot exercise control over the elements which compose it.

Another sort of association suggests itself, one in which the members agree to produce and sell under the orders or the direction of the officers of the association. This is not entirely satisfactory and is only effective if the members are not numerous, since many will not sacrifice their freedom of action and consequently the association cannot for long control sufficient production to maintain stability. Furthermore, such associations repeatedly have been found to be contrary to law. In any case they are weak on account of the large number of members—the difficulty of restraining individualism and selfishness and they do not decrease the cost of operation or the capital employed.

The most effective means of cooperation is that of combination or amalgamation of mines, smelters, refiners and fabricators into strong groups. There is unquestionable economy and security in the amalgamation of small companies into large ones. The cost of operating is reduced and an effective control over production can be maintained. In times of diminished markets small operators cannot shut down without bearing the whole burden of shut down expense. Large companies are able to shut down units and maintain a production in harmony with demand, and thus maintain a stable price for the commodity. The expense of shut-down of small units, so disastrous to the small operator, is distributed over such extensive operations and over so many shareholders that it is no burden. As a concrete case, there are four large mines operating at present on a reduced scale. One is making a good profit, one is making a fair profit, two are operating at cost or a loss. By combining the four, shutting down two, the remaining two could produce all the metal the four are producing at a less cost, and after deducting the shut-down expense, pay larger profit to the stockholders of the combined group than is being paid at present by the best one of the four. In addition to that advantage, danger of over-production would be eliminated, the reserves of the high cost mines conserved until the market justified their

utilization and the metal price would show a tendency to stabilize a higher level.

The most ideal situation, the one which tends to the most economic utilization of natural resources, is the one in which the metal prices are stable at a level which permits and induces the ultimate consumer to use all of the metals and their products that he reasonably needs. That is, the most ideal situation for both producer and consumer is stability of price at the highest level which will permit and induce the maximum essential consumption. A higher price or a greater volume is disastrous. It is only through large, strong organizations that this stable price volume relation can be attained and maintained. Over-production, under-production and varying prices result in loss. The Steel Corporation is an example of economic utilization. The finished product is sold to the consumer thus eliminating all the hazards, speculation and profits of these several intermediate sales. Price concessions are never forced by over-production or financial weakness, and are made primarily to stimulate business. The greatest stability, the most economic utilization of non-ferrous metals will come when the combined miner-fabricator produces only what he can sell to the ultimate consumer at a fair profit. Under the present condition, neither the shareholder, labor nor the Federal Government is getting a fair return from the exhausting of these natural resources.

Stability of price, economic adjustment of production to consumption is the end to be sought for, and it can be attained only by the producers cooperating with each other and forcing the removal of any obstacles, legal or otherwise, if such exist, which stand in the way of economic utilization. In this connection it is interesting to note that the present campaign program of the American Federation of Labor demands the repeal of the Sherman Act.

The inability of the industry to carry stocks accumulated in times of excess production, and to finance its exportable surplus is purely the result of its lack of organization and cooperation. It is unsound, wasteful and contrary to national interest for the industry to be forced to sell at a loss—to sell at less than their relative worth—the stocks of metal produced at high costs through the lack of organization and cooperation. Even though a part of these metals remain in existence, previously acquired wealth is consumed in their production and on account of their cheapness there is a tendency to use and destroy them in non-essential uses.

It is not entirely desirable to strive to create new uses for metals. Such a

course is usually designed to create a demand equal to an over-developed capacity to produce. It is at best a slow remedy and may result in a shortage of metals for essential uses when the normal demand has overhauled the capacity to produce. It is more desirable and it is better economics to so adjust production that it amply fills the existing demand, but does not exceed it. Such a course results in price stability and prevents shut-down losses.

Genuine cooperation and real organization of the industry makes for orderly production and marketing and prevents excess production. It must be borne in mind that, after all, metals are primarily international commodities. They must be produced where they exist. Tariffs and hot houses will not grow them. I do not wish to be misunderstood on the question of tariff, I am not considering it, I merely make the statement to establish the fact of the international character of metals. The international metal market affects directly the national market of a protected metal industry. Cooperation with foreign producers is essential in orderly marketing and stabilization of industry. If there were a reasonable cooperation with foreign producers of silver, that industry would not be in the unfortunate condition it is. There is no good reason why American capital producing silver or any other metal abroad should not cooperate with American capital producing silver or any other metal in the United States, in the orderly marketing of that silver or other metals. Germany's growth and power as an industrial nation was primarily the result of the German government's encouragement of cooperation to the point of encouraging monopolies.

The high cost of transportation is a railway problem in no way different from the problem of consolidation and combination, in the mining industry. The nation has finally come to the realization that its persecution and restriction of railway monopolies (so-called) and the "big interests" very nearly resulted in a collapse of the transportation system and it is now fortunately urging consolidation. It is a difficult problem now, whereas had the railways been given reasonable freedom of action, their natural growth and amalgamation would have made forced consolidation necessary. It is to the best interests of the mining industry to support such railway consolidation, as it presents the one hope for a real reduction in freight rates.

The inability of the non-ferrous mining industry to sell their metals (excepting lead) for a price comparable to the general commodity index is yet another result of over-production, lack of organization and too many producers

competing for a diminished market. It is obvious that unless the industry combines and consolidates into sound economic groups, another business depression will result in the same destructive competition, shut-downs and greater losses than the last.

As indicated by the present conditions the value of the non-ferrous metal production of the United States this year will be only about \$450,000,000 and the combined domestic and foreign production made by American capital will only be about \$560,000,000.

If, however, these five great non-ferrous metals had a purchasing power this year equivalent to the weighted average purchasing power they enjoyed from 1903 to 1913 and the market and trade conditions were normal with respect to the non-ferrous metal industry, the value of the domestic production this year would be about \$885,000,000 and the value of the combined domestic and foreign production made by American capital would be about \$1,125,000,000 or practically double what it actually will be. Obviously the government's loss of taxes, the loss to the industry, the loss to labor and the loss to the nation is too great to require comment.

This industry must abandon its policy of temporary expedients and attack its problems with greater vision and a fuller knowledge of its fundamental character and importance to the nation.

The best interests of the Nation demand of the industry that it economically utilize its natural resources. The industry cannot do this until it cooperates, consolidates and integrates into sound economic units, and, it is the obligation of the industry to the Nation as well as to its shareholders to strive for that end, obtaining legal permission if necessary.

SILVER PRODUCERS' MEETING CALLED

A CALL for a meeting of silver producers has been sent out by Chairman W. Mont Ferry of Salt Lake, who is managing director of the Silver King Coalition Mines Company of Park City, Utah, and Henry Rives of Reno, Nev., secretary, who is secretary of the Nevada Mine Operators' Association, to meet at Salt Lake on August 6.

Senator Oddie, Republican, Nevada, chairman of the Senate Gold and Silver Commission, will make an opening address reviewing present conditions and the work of the commission. Ex-Senator Thomas of Colorado will report on legal aspects of Treasury administration of the Pittman silver purchase act. Reports will also be made by C. F. Kelley and Alfred Harrell, chairman of the fact-finding and organization and finance committees appointed by the Reno meet-

ing last September. A permanent organization for the association is expected to be formed.

Considerable data will be presented by the commission, including a report of the Bureau of Mines as to the greater use of silver in industry; new coinage in foreign countries; observations of J. Parke Young on currency conditions in Europe; currency conditions in China and the need for currency reform, with particular reference to the Shanghai mint; correspondence between the commission and the Dawes Reparations Committee; a review of the Dawes reparation settlement plan; and a report by a Swedish economist on the gold standard.

Fletcher Hamilton will report on testimony of producers taken by him and submit recommendations. Senator Pittman, Democrat, Nevada, is also expected to attend the meeting.

The commission is receiving cooperation from copper, lead, zinc and gold producers in obtaining data as to cost of production, investment and yield on investment in the nonferrous metal mining industry. This inquiry is being conducted by Capt. H. A. C. Jenison. Gold and silver producers are said to be slower than others in furnishing data on account of the fact that some of their properties have been closed. Producers are urged to expedite their reports in order that the commission may have accurate and complete information on which to base its reports. Copper producers have furnished complete statistics for the past twenty years.

The purpose of the meeting, as announced, is to aid silver producers market their product to best advantage. At the temporary meeting in Reno last fall various committees were appointed to make various studies and report back to the organization at a later meeting.

The call for the meeting says:

"It was expected that the meeting would occur at a much earlier date but, as you have been informed, the fact-finding committee was long unable to obtain certain information from official sources vital to success of the movement in behalf of silver. This committee is now ready to report as is also the committee on organization and finance.

"The association will likewise receive the report of Senator Thomas who has been working on the legal aspects of certain acts of the Treasury Department affecting the operation of the Pittman act. It will also learn of the results of research work of the Bureau of Mines respecting the industrial use of silver, and it will receive from the Senate commission of gold and silver inquiry information of importance to producers.

"The meeting will be an important one, so that all American silver producers are urged to attend.

WHISKERINOS AND THE DAYS OF '49

Famous Organization To Entertain Delegates To Twenty-seventh Annual Convention American Mining Congress—Days Of '49 To Be Reproduced—Entertainment To Be Most Unusual And Picturesque

By BERT F. HEWS

TURNING back Father Time's ledger 76 years to those unforgettable "days of gold," the Department of Mines and Mining of the Sacramento Chamber of Commerce, assisted by the famous Whiskerinos of the Capital City of California, and the Placer County Chamber of Commerce, will endeavor to recreate the historic pioneer days for the entertainment of the delegates to the twenty-seventh annual convention of the American Mining Congress, which convenes in Sacramento September 29.

Efforts will be made to picture for the nation's leaders in mining and industry the manner of life of those brave men and women who conquered the wilderness and laid the foundation of the great commonwealth of California with bricks of gold. This year marks the seventy-sixth anniversary of the discovery of a gold nugget in the millrace of John A. Sutter's new sawmill at Coloma, El Dorado County, by James W. Marshall, and it is felt that it is appropriate that the Sacramento entertainment should be of the '49 vintage.

Delegates will glimpse the hardships, the pleasures and the costumes of those valiant "argonauts of '49" who gave to the world the famous "Mother Lode" which has produced two billions of dollars in gold and which is the potential yield of many times that amount.

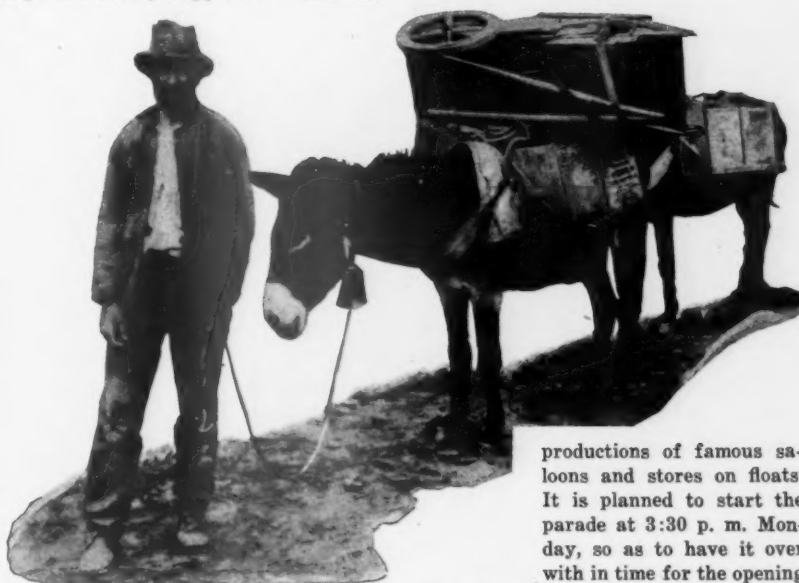
PIONEER COSTUMES

It has been decided to make the opening day of the convention "Whiskerino Day," when the program for the afternoon and evening will be in charge of the famous bewhiskered organization which made the "Days of '49" celebration in May, 1922, internationally famous. Hearty cooperation has been assured the department by Camp '49, parent body, and the various Whiskerino "hangouts" in the old mining towns, which will be visited by the delegates. Through the cooperation of the Whiskerinos and the city officials, it is hoped to get the entire populace of Sacramento—now estimated at 100,000—to don the garb of the forty-niners for this opening day, if not for the entire week. And the Whiskerinos have solemnly sworn to again grow beards as they did in May, 1922, and to don the red shirt, broad-brimmed slouch hat, red kerchief, rough trousers, boots and trusty shooting iron.

If the plans of the American Mining Congress are successful, a special train

of 125 representative mining, industrial and financial leaders of the nation, as well as cabinet officers and heads of federal departments, will leave Chicago September 23 for Sacramento, making stops at Denver, Cripple Creek and Salt

thousands of school children in quaint pioneer garb will march. All the old rigs and vehicles will be utilized. No motor-driven vehicles will be permitted, and to onlookers it will appear as though the world had been turned back for 76 years. There will be ox-teams and re-



The Old Time Prospector

Lake City, and arriving in Sacramento shortly before noon on Monday, September 29. Reservations already made for this train virtually insure its coming.

It is the plan of the Whiskerinos to meet this train in true frontier manner on its arrival. It will be properly "shot up" by bearded villains on horseback, and raided by grim-faced, red-shirted miners. The "tenderfeet" will be escorted to a long line of old Concord stage coaches, prairie schooners and burros, resurrected from the pioneer bypaths of California, and then taken to a '49 feed after a parade through town. No motor vehicles will be permitted during that time on the streets.

PLAN PIONEER PARADE

If it can be possibly done, it is the plan of the department and the Whiskerinos to reproduce the famous pioneer parade, three miles long, which was the big culminating feature of "Days of '49." All the historic counties of California will be asked to enter pioneer floats, and delegations in the parade and

productions of famous saloons and stores on floats. It is planned to start the parade at 3:30 p. m. Monday, so as to have it over with in time for the opening

open-air reception in Capitol Park.

The Whiskerinos will also play a vital part, assisted by the '49 Log Cabin Club, the Gold Seekers and the Whiskerettes, the three pioneer women's organizations, and by the Redmen, Scouts and Spanish societies, in the night program. In a series of episodes there will be enacted the early periods of California history; the era of the Indians; the coming of the padres and the gay Spanish cavaliers and senoritas; the arrival of the Russians; the coming up the Sacramento River of Gen. John A. Sutter and his brave little band in 1839; the founding of Sutter's Fort and the city of Sacramento; the battles with the Indians; the departure of troops to fight the Mexicans; the discovery of gold; the rush of the gold hunters; the "days of '49"; and the coming of industry and agriculture.

Justice E. C. Hart, of the Appellate Court, is the Chief Whiskerino and is enthusiastic over the plans for the entertainment of the delegates. "Hangouts," the branches of the grand lodge of Whiskerinos, Camp '49, are being organized in the pioneer mining districts to

properly receive the delegates on the various tours following the convention.

"AUBURN RAVINE OF '49"

The afternoon of Wednesday, October 1, has been set aside for auto tours for the delegates. For that day Placer County, through its Chamber of Commerce and its Board of Supervisors, is planning a pageant and night entertainment that will live in the memory of the delegates till the day of their death.

As outlined by Secretary P. B. Goss of the Placer County Chamber, old Auburn ravine, which produced its millions in the early days, is to be restored for half a mile as it was in 1849. Old "long toms," rockers, crude stamp mills and little log shelters will be again placed in the stream and gravels of the ravine. Old pioneer white miners will return to their days of youth and operate once again the long sluice boxes, the rockers and the old stamp mills, while the Chinese miners will pan the stream for the gold. Nothing modern will be permitted to mar the truthfulness of this portrayal of early mining days.

Then the old pioneer part of the city of Auburn, at the west end of the community, now desolate and deserted, will be brought to life once more. The long iron shutters will be opened up, and the shelves of the stores will bear pioneer stocks. From the dance halls will come the quaint tunes of the past, the raucous voice of the "caller," the squeak of old violins, and the laugh and jest of the dance-hall girls; from the long silent gambling halls will come the click of the roulette wheels, rattle of chips, the shuffling of cards, the voices of excited players and now and then a shot; from the dust-covered, almost forgotten bars of the "thirst emporiums" will come the clink of glasses, the dulcet tones of guggling liquor, the jests of the miners, and the occasional "scrap." Of course, all attendants and hundreds of Placerites thronging the buildings will be in true '49 garb.

"And the lid will be lifted clear off," promise Placerites.

It is also planned to have El Dorado and Nevada Counties take over some of the old buildings and place in them some of their own placer relics.

The delegates will be taken direct to Auburn. At 5 p. m. a '49 barbecue will be served. In the evening, the old Auburn resorts will operate full blast, with an occasional "necktie party" and shooting affray to add

the rough pioneer atmosphere, and no imagination will be required to make the delegates think they are actually back in 1849. About 9:30 p. m. the return trip will be made to Sacramento.

Thus will end a memorable day in the lives of the mining delegates. During the two-day tours of the delegates on Saturday and Sunday, they will be met in the old mining towns by Whiskerinos, and the outdoor luncheons will have the pioneer atmosphere.

PROPOSE INDIAN PAGEANT

For a small group of the delegates, it is planned to stage an Indian pageant at Napa Soda Springs, 75 miles from Sacramento. At one time 5,000 Indians lived in the Napa Valley, named after the Napa Tribe. After nightfall the Indians will swoop down out of the hills and set up their tepees and dance "sweathouse" in front of the hotel. Campfires will glint through the trees. The famous dances of the tribes will be staged. Then will come the white settlers, and drive them back into the hills. After witnessing the sunrise over a 50-mile stretch of valleys, the delegates will be taken back to Sacramento in time for the opening of Thursday morning's session of the convention.

These affairs are only tentatively planned at present, and undoubtedly their magnitude will be increased, as well as others devised for the entertainment of the delegates. It is probable about 200 of them will also be taken to Oroville, where gold dredging originated, Wednesday afternoon, and possibly brought over to Auburn in time for the night's entertainment.

It is certain that no delegate who attends the convention will leave without a faithful idea of how the pioneers of California lived, and without an undying admiration for those sturdy sons and daughters of Yankees who blazed the trail to the western shores of America, who laid the foundation for one of the world's greatest commonwealths—California.

GOLD, THE LIFE RESTORER

WE hear it said on all sides that our "mountain of gold," the \$4,500,000,000 monetary gold stock of the United States, is for the most part costly and useless. "That reminds me," said a banker who was once a practising physician. "It sometimes happens that a sick man goes to his physician and complains that he is discouraged and disgusted with life. He feels that he has no place anywhere, that he is useless, and an utter failure. He has a strong urge to put an end to his existence. In such cases of deep despondency with suicidal tendency a physician sometimes prescribes aurum metallicum, the medical name for gold, simon-pure gold. After a few doses, often after one, the patient takes a new hold on life, becomes cheerful, buoyant and often optimistic."

The aurum metallicum was not useless lying idle in its phial before the sick man came, nor after his recovery. Its potential usefulness awaits the next patient. What the nations of Europe need is just a few doses of aurum metallicum, properly diluted in the form of dollar credits. But we will hold the phial—our "mountains of gold"—safe and fast. It may be useful.—(*Wall Street Journal.*)

MINE SAFETY CONFERENCE

It is reported that President Coolidge is considering the advisability of calling a conference in Washington in September of governors of coal-producing states and coal operators and miners on a program of concerted federal and state action toward the promotion of mine safety. Such a conference was urged last winter by Representative Robsion, Republican, Kentucky, chairman of the House Mines and Mining Committee, in view of the series of mine disasters. At that time the President favorably considered the proposed conference but thought it advisable to postpone it until November. Since then it is understood considerable pressure has been brought to bear upon the President to hold the conference earlier, and present indications are that it will be held some time in September. The purpose of the conference will be to establish better co-ordination of work of the federal and state governments, and coal operators and miners on mine safety.



Sutters Fort, Birthplace of American Settlement in California

HISTORY OF OROVILLE GOLD DREDGING*

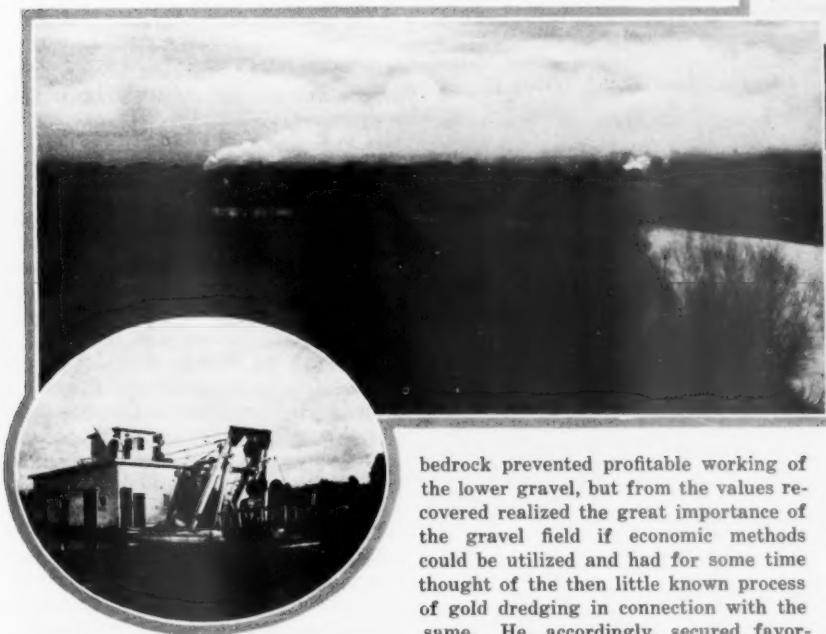
First Dredge Installed In 1849 Unsuccessful—Real Success Not Attained Until 1901—Thirty-five Dredgers And Twelve Dredging Companies Operated In Oroville District In 1908—Over Fifteen Millions In Gold Recovered In Ten-Year Period—Two Dredgers All That Remain In Operation

YEARS of evolution were required for the gold dredging industry to reach the present stage of practical success. Among the first ideas that occurred to many of the early gold hunters in California was the use of a machine to scoop up the gravel from the inaccessible beds and bars of auriferous streams, and it was only a few months after Marshall's discovery of gold in California that a machine was shipped around the Horn from New York to San Francisco. It arrived in 1849 and was soon at the bottom of the Sacramento River. During the succeeding years many attempts at gold dredging were made in California and elsewhere in the western states of America, but, with the

By LEWIS E. AUBURY

Dredging in California began in the Oroville district. W. P. Hammon and Warren Treat were among the first to attempt working the gravels for gold on a large scale, or by different methods than the sluice-box or rocker. Treat, in the summer of 1895, sunk a pit of about 100 feet square to bedrock, using a centrifugal pump to handle the water, and in spite of the heavy costs, caused by the rehandling of the gravel several times by manual labor and pumping, made a profit. Hammon, working another pit, found the heavy flow of water on approaching

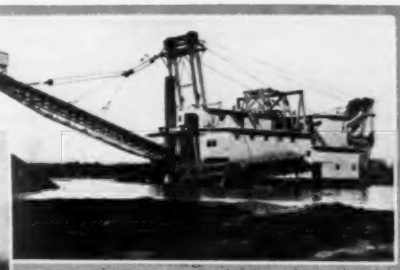
sults obtained from a number of shafts sunk at the various parts of the field were so satisfactory that Captain Couch said that if the gravel contained gold below the water level in proportion to that found above he would feel justified in ordering the construction of a dredge. In order to determine the value of the gravel below water level permission was secured to use the pumping plant of Treat, the pit being unwatered and the sides sampled. The results being satisfactory, the contract was made for the first dredge, the Couch No. 1. This



exception of the operation with double-lift-bucket elevator dredgers at Grass-hopper Creek, Mont., in 1894, all proved failures.

It was not until 1897 that a dredge with a single-lift-bucket elevator type was floated in California. This dredge, which was constructed by the Risdon Iron Works for R. H. Postlethwaithe and floated on the Yuba River, would probably have been a success if located at Oroville. Being, however, in a turbulent stream, the dredge was wrecked and not recommissioned.

* (Material taken from "Gold Dredging in California.")



U. S. Bureau of Mines Photo

A gold dredge in operation in the Oroville district. (Center) Oroville from the Feather River, dredger rock pile in the foreground. (Below) Old Oroville "Gold Ship," one of the earliest types of gold dredgers

bedrock prevented profitable working of the lower gravel, but from the values recovered realized the great importance of the gravel field if economic methods could be utilized and had for some time thought of the then little known process of gold dredging in connection with the same. He, accordingly, secured favorable options on a large area of ground in the vicinity of Oroville. Thomas Couch, a Montana mining man, was interested in the venture by Frank T. Sutherland and agreed to have a thorough test of the gravel made and to finance the proposition if the results proved satisfactory.

The manner of prospecting at that time was crude as compared to the present methods. A couple of Chinamen with picks, shovels, pans and rocker comprised the outfit. A shaft was sunk until water level was reached and the gravel put through a rocker, the tailings from the rocker being carefully panned. The re-

dredge, later known as "Feather River No. 1," was by no means an unqualified success at first. Couch and Hammon experienced weeks and months of anxiety and expended large sums of money in changes and repairs before demonstrating that the venture was not a failure. It may be said that during this time the fate of the dredging industry hung in a balance, at least as far as the Oroville district was concerned. Thomas Couch lived to see his ventures a far greater success than anticipated, and W. P. Hammon has been the leading gold dredger operator in California.

"GOLD SHIP" FLOATED 1908

The first gold dredge in Oroville was floated March 1, 1908. It was of bucket-line type. From that date on the industry expanded rapidly. Four single-bucket dredges were built, but this type, however, rapidly became obsolete. The bucket elevator is the only type of dredge that has been a financial success in gold dredging. From 1898 to 1902 the principal dredges were of the single-lift, open-

link-bucket elevator type equipped with tailings stacker. In 1899 and 1900 two double-lift, open-link-bucket elevator dredges, equipped with tail sluices, were constructed, one by F. W. Griffin and D. P. Cameron and one by the Bucyrus Company, and put in operation at Oroville and at Folsom. It was not until 1901 that dredge constructors abandoned the double-link dredger and centered their attention to the perfecting of the single-lift type equipped with close connected buckets and belt tailing stackers, driven by electricity in place of steam. It may be said, therefore, that the history of the large modern California gold dredge commenced with the construction of the first electrically driven, single-lift, close connected bucket elevator dredge in the Oroville field in 1901. The first dredges in the Oroville district were equipped with $3\frac{1}{4}$ -cubic-foot buckets. By 1908 there were five 7-cubic-foot and three $7\frac{1}{2}$ -cubic-foot dredgers in the Oroville district. In 1908, when the industry was at its height, there were thirty-five dredgers and twelve dredging companies operating in the Oroville field. At the beginning of 1909 there were thirteen companies operating thirty dredgers and controlling 6,450 acres of land. During the first ten years of operation the dredgers produced approximately \$15,049,940 worth of gold.

DESCRIPTION OF DREDGING

In the development of the California dredge the digging end of the machine was first developed, the rest of the machinery increasing in size and strength in order to withstand the additional strain caused by the increased capacity of the buckets. The weight of the buckets increased from 500 to over 4,000 pounds each and the machinery of the dredge as a whole from about 150,000 pounds to over 1,500,000 pounds in the larger machines, while the capacity of the dredge increased from about 20,000 to 300,000 cubic yards per month. The change from open connected to close connected bucket line increased the capacity of the individual dredge, and the change from head line to spud made for rigidity, decreasing the wear and tear. The standard dredge in use in California consists in a general way of a wooden hull built on the lines of a rectangle with forward corners slightly curved. An opening, or well, through the center of the bow extends back to the middle of the hull, where a superstructure, or middle gantry, supports the upper end of the ladder, the lower end being supported by cables which pass over sheaves on the front gantry to a drum so that the ladder may be raised or lowered. A line of buckets, which excavates the gravel, is mounted on this ladder and operates through the well, rollers being fixed on

the upper side of the ladder to carry the buckets. The buckets fill with gravel as they pass around the tumbler at the lower end of the ladder and, carrying the material to a height of about 25 feet above the deck of the dredge, dump when passing over the upper tumbler. The bucket line is revolved by the upper tumbler through a train of gears, mounted on the sides of the tumbler and belted to a motor.

The gravel from the buckets is dumped into a hopper, water jets directing a stream against the sides and bottoms of the buckets, from the hopper the gravel and water pass through a revolving or shaking screen which separates the coarse gravel from the fine, additional water from perforated spraying pipes extending nearly the full length of the screens being supplied under pressure to the traveling gravel. The coarse material passes over the lower end of the screen and is stacked behind the dredge by means of a belt conveyor, the gold-bearing material passes through the perforations of the screen into a distributor from which it flows over a series of riffle sluices or gold-saving tables on which mercury is sprinkled to amalgamate and save the gold. The fine gravel and sand from the gold-saving tables pass into side or tail sluices extending well behind the dredge.

Since 1909 the dredging industry in the Oroville field has gradually declined. One or two of the dredgers were burned, a couple destroyed by flood, but the most of them shut down because they had worked out their ground or that portion of it in which paying gravel was found. Today there are only two dredgers operating in the Oroville field, the last remnant of that vast fleet which once made Oroville a great center of the dredging industry. While hundreds of acres of land have been upturned and nothing is left visible to the eye except the rock piles extending in all directions, thousands and thousands of dollars made from the dredgers has been turned back to Oroville by way of industrial enterprise and agricultural development. Some of the rock piles have been leveled for horticultural purposes. More has been leveled in supplying the rock crushers with material, but a large majority of the rock piles must remain as they are until some man with a vision and inventive genius develops a method by which they can be reclaimed economically.

BARYTES AND BARIUM PRODUCTS IN 1923

THERE was a notable increase in the output of barytes in the United States in 1923, according to the Department of the Interior, as shown by statistics compiled by the Geological Survey

working in cooperation with the geological surveys of the producing states, and of lithopone and the various barium chemicals, and there was a resultant decrease in the imports of these commodities. On the other hand, the production of ground barytes fell off considerably and the imports were larger.

BARYTES

The crude barytes shipped from mines in the United States in 1923 amounted to 214,183 short tons, valued at \$1,664,156, an increase of 38 percent in quantity and 48 percent in value over the output in 1922. This output was exceeded only in 1916 and 1920. Georgia shipped 39 percent, Missouri 38 percent, and Tennessee 16 percent of the total.

Imports of crude barytes in 1923 amounted to 15,045 short tons, worth \$93,721 at port of shipment, a decrease of 35 percent in quantity. A small quantity of barytes was exported to Canada.

BARIUM PRODUCTS

The manufacturers of barium products used 210,587 short tons of domestic and imported crude barytes in 1923 in the production of ground barytes, lithopone and barium chemicals. The shipments of ground barytes were 39,605 short tons, valued at \$895,095, a decrease of 14 percent in quantity from 1922. The sales of lithopone were 98,199 short tons, worth \$11,608,443, an increase of 18 percent in quantity. Manufacturers of barium chemicals report the shipment of 16,803 short tons, worth \$1,215,596, a quantity 21 percent larger than in 1922. These chemicals consisted of 6,362 tons of barium carbonate, 3,301 tons of barium chloride, 6,761 tons of barium sulphate, and smaller quantities of barium hydroxide and sulphide.

The imports of ground barytes were 6,022 short tons, valued at \$88,741, an increase in quantity of 28 percent. There was a slight increase in the imports of natural barium carbonate (ground witherite), which were 1,557 tons, valued at \$41,823. The imports of lithopone were 10,440 tons, worth \$776,383, a decrease in quantity and particularly in value. There was a decrease of 55 percent in the total imports of the barium chemicals—binocide, sulphate, chloride and artificial barium carbonate. The figures showing the imports of barium hydroxide and nitrate are not available for comparison for dates prior to September 22, 1922, but 181 tons of barium hydroxide, valued at \$16,872, and 511 tons of barium nitrate, worth \$59,766, were imported in 1923.

Exports of lithopone in 1923 amounted to 1,485 short tons, valued at \$176,624, about 8 percent less in quantity than in 1922.

COAL IN THE CAMPAIGN

A Kind Of Regulation Is Promised By All Who Would Control The Government. The People, Being Without An Issue, Have No Apparent Choice But To Pay The Resulting Bill

EVEN a cursory examination of the political platforms now before the people discloses the fact that all three of them deal with coal, after a fashion.

That is, the Republican party boiled the Coal Commission's report down to one plank which says that, in emergencies, the President should have a statement of the facts in any controversy between capital and labor and that the President should have power to supervise distribution in emergencies. It denies that the Government may fix prices.

The Democratic party says that the Government ought to control the anthracite industry—details lacking. It also says that the Government should encourage the mining industry, including coal.

The Radicals say that the Government ought to own and operate all natural resource producing units—including coal mines, of course.

The reaction of the coal industry to these three platform declarations is tremendously interesting even if a little discouraging. It registers the more or less non-resistant attitude that all business is coming to assume toward political aggressions. That is, a year ago the nation was all outraged by and the trade was furious over the report of the Coal Commission, which recommended that the industry make its facts public. But when the Republican party recommended the same thing, nobody got excited. A year ago it was looked upon as an encroachment upon individual liberty. The idea that any individual should be compelled to surrender the facts of his business to public scrutiny was declared to be revolutionary and unconstitutional. Certainly, it was considered unwise that the Government should attempt, as was implied, to arbitrate between employer and employee. It was declared that this would have a tendency to teach the employee to look to Government instead of his employer to fix his wages. And this would have a tendency to cause the Government to fix the wages and hence to compel the other people to pay the price for the commodity which would enable the operator to pay the dictated wage. After a year in which there has been practically no debate of the question, the Republican declaration on the same question comes along and is passed over without comment. It is accepted not because it is right or because the situation has changed but because it is

By GEORGE H. CUSHING



The Landing Looks a Bit Difficult

milder than the other two declarations on the same subject.

The Democratic declaration in favor of government control of the anthracite industry is received in somewhat the same way. That is, the coal industry is inclined to consider that, after a fashion, it was a victory to have only anthracite mentioned. Indeed, Senator Walsh, who wrote that plank in the platform, didn't have the qualifying word "anthracite" in the first draft. He merely had said "to control the coal industry." The



An Optimistic Bird

word "anthracite" was written in as an afterthought. Seeing that one of the most radical of the Democrats modified his language, the coal men say that when the politicians are proposing to take only one fraction of the industry, it isn't quite so bad as it might have been. The word "anthracite" might have been left out. Therefore, the Democratic party might have committed itself to government control of the whole of the coal industry. Because the Democrats took only a shoe instead of the whole hoof, the trade believes it got off pretty easy.

The Radical declaration is similarly glossed over. That is, the coal industry passes over that revolutionary proposal on the comfortable assurance, as they believe, that the Radicals have no chance of success; therefore, they will have no opportunity to work their will upon governmental processes.

As far as is discernible at this moment, there is no appreciation of the outstanding fact that, for the first time in our political history, coal has become definitely a political subject because it is treated by name in all three of the political platforms.

There is expressed, nowhere, any alarm over the fact that there is before the people really no issue over coal. The three parties apparently agree that there must be some kind of regulation of coal by Government. On that they are all of one accord. The only difference, therefore, between the three parties is the degree of regulation which shall immediately be undertaken. The Republicans say merely that we should have a moderate degree of fact-finding followed by interference only in cases of emergency. The Democrats demand federal "control" of what they consider the luxury coal product. And the Radicals to government ownership and operation of everything. In other words, we have started on exactly the same program, politically, that the railways started on 30 years ago. The result is going to be exactly the same, because the political process is exactly the same. The parties are appealing to the people on merely a different degree of regulation. Each party appeals on the basis that: "If you allow us to do it we will treat coal men rougher than will the other fellow."

There is no issue because there is no party defending the liberty of coal men while another party is attacking it. On the contrary, the political assumption is

that the liberty of the industry must be taken from it. The only apparent question is how far the Federal Government should attempt to encroach upon that liberty at this particular time.

If there were an issue—a real issue—before the people, the parties would line up on two sides of the question, as they have done for two generations on the tariff. One party would have recommended control; the other party would have recommended no control. The people then would be in position to make an intelligent choice. They would, by selecting their party, decide the coal question in reality. They would decide in favor of regulation or a hands-off policy. Instead, on the first occasion when the coal industry comes into the political arena, all parties have exactly the same mental attitude toward it as a political subject. That attitude is that coal must be controlled. The only difference, therefore, between them is one of degree.

From the standpoint of sound economics, it is tremendously unfortunate that the party declarations were not further apart. This country ought to have an opportunity to decide between regulation of a pronounced character, or no regulation at all.

For example: Coal is one of many sources of heat and power, because carbon is one of many chemical elements. If coal, as an industry, is going to live, then carbon as a chemical element must have an equal chance with all other chemical elements, the reaction of which will create heat and power. If we leave the other chemical elements free from governmental regulation, but include coal, that merely puts coal under a handicap. Thus, the proposal to regulate coal is a proposal to put it under a handicap for the advantage of its natural adversaries.

Perhaps that is stating the conclusion before stating the facts upon which the conclusion is based. Nevertheless, it must stand to reason that if the Government is going to prescribe the wages and the other factors in the cost of coal production, it is going, practically, to fix the cost at which coal must sell. And if the Government is thus going to take over personal property it must, if governmental processes are to be sound, return to the person whose property is involved, its cost plus some measure of profit. Otherwise there would be taking of property without due process of law. Governmental regulation, therefore, which first predetermines the cost and afterwards fixes the price of cost, plus the profit, tends, automatically, to increase the cost and the price, and hence to put coal out of line with its other natural

competitors. This, in the ultimate analysis, means the gradual and piecemeal elimination of the coal industry from America by the process of graduated handicaps.

When so much is involved in any political discussion, and when the proposition just stated is so readily amenable to proof, it is unfortunate that on coal's initial advent into the political arena the parties were not more clearly divided—one against and the other for regulation.

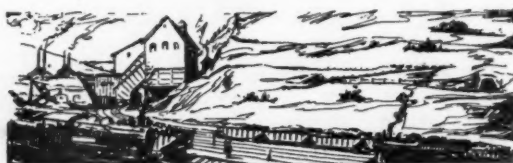
And it is unfortunate, also, that the industry itself has not, up to now, realized the hopelessly inadequate submission of this question to the public in the form of platform declarations.

In any event, the subject is submitted to the people in the way indicated. The coal and other industries will have to recognize that the successful party will act on the theory that it has obtained from the people a mandate in accord with its platform declaration. Therefore, the successful party may be expected to introduce legislation along the line of its platform pronouncement. In view of the fact that parties these days are planning to put their platform declarations immediately into effect, and are even speeding up the process of changing administrations after an election to expedite the mandates of the public, it may be taken for granted that coal will be a lively subject before the next session of Congress.

This inevitable situation gives the industry a tremendous job to do if it is to preserve its liberty and to preserve sound economic processes in this country. This is not the time or the place for the suggestion of the methods which should be pursued. However, seeing how much is involved, the form of submission of this question to the public should be one to challenge not only the coal industry but all those who are equally interested in sound economics in the nation. Therefore, it is not a question for coal alone, but for all business to consider.

URGES INCREASED COAL PRODUCTION

THE Interstate Commerce Commission has recently issued a statement urging increased coal production to avoid car congestion, they assert that:



"The average production of bituminous per year for the past seven years (exclusive of the strike year 1922) has been 520,000,000 tons. The average production in the last six months of such years was 6.8 percent greater than the average for the first six months. For the first half of this year production has been about 227,639,000 tons. If in the last half of this year production is 6.8 percent greater than in the first half, the total for the last six months will be 243,118,000 tons, or an average of 9,500,000 tons weekly for weeks of six working days each. Since April 1, 1924, bituminous produced has been less than 7,500,000 tons per week. If shipments of bituminous for winter consumption are deferred, railroads will be called upon to handle a very large quantity of coal during the peak freight movement in the fall.

"The aggregate of bituminous shipped via lake to the Northwest to June 30, 1924, plus bituminous stocks at the head of the lakes April 1 is 12 percent less than for 1923 and 16 percent less than for 1921, although larger than in 1920 and 1922. During the fall of 1920 and 1922 there were car shortages, and in the latter year a miners' strike.

"Coal stocks on docks at Duluth, Superior, Ashland and Washburn June 15 aggregated 3,125,663 tons, as compared with 2,179,999 tons June 15, 1923, an increase of 944,664 tons, indicating that less coal has been distributed from the head of the lakes than at this period last year.

It is urgently suggested to people of the Northwest that they purchase coal early, in order to avoid curtailment in transportation necessary for heavy movement of agricultural products.

"There are no records respecting present coal stocks. Stocks January 1, 1924, aggregated 62,000,000 tons. At that time railroad coal stocks totaled 19,367,956 tons, as compared with 15,530,327 tons June 1, a decrease of 20 percent. If the same percentage of decrease is applied to aggregate stocks, the figure of January 1 would be reduced to 49,600,000 tons, which may be a fair estimate of coal stocks of June 1, 1924.

Fall months are usually peak months of transportation, and if carriers are called upon to handle an enormous coal traffic during those months in addition to other commodities, their facilities will be taxed.

"It is necessary to increase coal production prior to the peak movement to avoid transportation shortages."

COAL IN POWER DEVELOPMENT

Building Of Large, Centralized Steam-Electric Plants And Development Of Large Hydro-Electric Projects Mean Saving Of 50,000,000 Tons Of Coal Every Year—Northeastern Super-Power Project—Engineers' Committee Makes Report

PRINCIPAL dependence upon generation of power in the northeastern section of the country is placed upon coal by a report of an engineer subcommittee of the Super-Power Committee of which Secretary of Commerce Hoover is chairman. Other members of the committee are:

Maine—William M. Black, chief engineer, Public Utilities Commission; New Hampshire—John W. Storrs, Public Service Commission; Vermont—Ryland L. Lockwood, designated by Public Service Commission; Massachusetts—Harold K. Barrows, consulting engineer, designated by Department of Public Utilities; Rhode Island—David Daly, designated by Public Utilities Commission; Connecticut—A. E. Knowlton, designated by Public Utilities Commission; New York—Dwight B. LaDu, state engineer and surveyor; New Jersey—Col. William A. Starrett and Frederick C. Schneider, designated by the Governor of New Jersey; Pennsylvania—Morris L. Cooke, director, Giant Power Survey Board; Maryland—H. Carl Wolf, chief engineer, Public Service Commission; Dr. George Otis Smith, director, Geological Survey; N. C. Grover, chief hydraulic engineer, Geological Survey; Col. William Kelly, chief engineer, Federal Power Commission; Major. G. R. Young, Corps of Engineers, U. S. Army; H. W. Hobbs, War Department.

SUMMARY OF REPORT

The increasing electrical power demands of the northeastern area, if they are to be supplied on an economical and adequate basis, necessitate the extension of interconnection between the different systems, the building of large, centralized, steam-electric plants located at strategic points and the development of the large hydro electric projects, according to the committee.

These recommendations will mean the saving of over 50,000,000 tons of coal every year; production of power at less cost; security in power supplies against interruption with its losses through disturbed production and unemployment; larger reserves of power through which other industrial development need not lag, awaiting power construction; electrification of transportation with increase in its efficiency; extension of power uses to the farm and saving of human effort.

The report is an outgrowth

of a conference held in New York last October, with the consent of President Coolidge, between Secretary Hoover and the chairmen of the State Utilities Commission of the northeastern states. This conference led to the formation of the Northeastern Superpower Committee, composed of representatives of the states and the Federal Government. While others were engaged on the legal questions involved, an engineer subcommittee undertook a comprehensive survey of the technical aspects of superpower development in the states affected. Their report will be referred to a meeting of the full committee to be held some time next fall.

The survey of power facilities and power needs made by the engineer subcommittee covers the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia. There has been included also some reference to the states of Ohio, Virginia and West Virginia, since under certain circumstances power in these regions will be contributory.

This region comprises one of several power areas into which the United States naturally divides itself. Forty percent of the country's population, consuming 50 percent of the nation's electrical power production and operating 60 percent of the primary power of the whole country is concentrated in this particular area. The use of electrical power therein has been increasing at the rate of 10 percent per annum, and in the committee's opinion the demand will reach 30.8 billion kilowatt hours in 1930.

POWER FROM COAL

"The demand for electrical power within this area is supplied from water and from coal," the report says. "The present developed water power is about 3,036,000 horsepower; the total potential water power available 90 percent of the time is 5,426,000 horsepower. This is increased to 7,914,000 horsepower available 50 percent of the time.

"At present we have developed about 38 percent of the total water power ultimately available in this area. But practical development of water power will probably be such that not over 25 percent of the total power demand in any year can be met from this source. Principal dependence, therefore, must be placed upon generation of power from coal.

"There are in this area nearly two hundred different utility companies engaged in power production and distribution, many under common ownership. Of these about 45 percent are technically interconnected but only about 8 percent of the interconnections have capacity large enough for effective interchange of power. Great economies in cost of production can be secured from the early effective interconnection of these utility systems, in some cases involving larger and systematic high voltage transmission."

Such interconnection, according to the engineers, will lead to the reduction of the amount of reserve equipment, "better average load factor through pooling of daily and seasonal load variation and wide diversification of use through increased industrial consumption," and more security in power supply against interruption by many causes. It will also mean that available water power in the area can be much more advantageously applied to carry base or peak load as local conditions may require. It should make possible the use of secondary water power which arises from the seasonal flow of streams, and thus bring into practical use a larger quantity of water power than would otherwise be possible. Finally, power would be available more quickly to meet growing demands.

The report points out that the economic generation and distribution of power vitally requires that it be produced in large plants. Present practice indicates that such plants should be constructed with total capacities of

from 200,000 to 500,000 kilowatts, using generators of not less than 20,000 kilowatts each. Because great plants of this character require immense quantities of water for condensation purposes, their location will be controlled by considerations of water supply. A study of available



water supply has led the engineers to the conclusion that the location of such plants will accordingly be restricted to the seaboard, the Great Lakes, the Ohio River and its tributaries, and the Susquehanna River.

POWER PROJECTS

Turning from steam plants to a discussion of water power, the engineers declare that the large demand affords an immediate market for the cheaper water power from the larger projects and renders their development both urgent and necessary. At the same time the large use of steam in the area makes possible the use of the seasonal flow of rivers for relief of steam, and thus enables more complete utilization of the rivers than in any other part of the United States. Interconnection in some cases will convert secondary hydro power into primary power and in other cases will enable daily peak loads to be carried on hydro. The great water powers capable of expansion, according to the report, are: The Niagara River, the St. Lawrence River, the Delaware River, the Susquehanna River, the tributaries of the upper Ohio, the rivers of the Adirondacks, the Potomac River and the rivers of Maine.

The report represents months of study and contains facts from the participating states and federal sources many of which have not heretofore been collected. It includes charts covering the different states and the area as a whole showing developed and potential power, electric and nonelectric power consumption, transmission systems, primary transmission lines, comparison of the costs of power from various sources and much additional information of vital importance. Basic assumptions and cost data are included applying to steam power, water power and transmission.

The members of the Northeastern Superpower Committee are: Chairman, Secretary Hoover. Maine—Charles E. Gurney, chairman, Public Utilities Commission; New Hampshire, William T. Gunnison, chairman, Public Service Commission; Vermont—Ernest H. West, Public Service Commission; Massachusetts—Henry C. Atwill, chairman, Department of Public Utilities; Rhode Island—William C. Bliss, chairman, Public Utilities Commission; Connecticut—Richard T. Higgins, chairman, Public Utilities Commission; New York—Alexander MacDonald, conservation commissioner; Dwight B. LaDu, state engineer and surveyor; George E. Van Kernen, deputy attorney general; New Jersey—Col. William A. Starrett; Frederick C. Schneider; Pennsylvania—William D. B. Ainey, chairman, Public Service Commission; Morris L. Cooke, director, Giant Power Survey Board; Phillip P. Wells, deputy attorney gen-

eral; Maryland—Ezra B. Whitman, Public Service Commission; Dr. George Otis Smith, director, Geological Survey; O. C. Merrill, secretary, Federal Power Commission; Major. G. R. Young, Corps of Engineers, United States Army.

NATIONAL SAFETY COUNCIL MEETS

Haulage, Mine Rescue, Prevention Of Explosions, Principal Topics

OF inestimable value to the Middle West industry was the Coal Mining Safety Conference held under the auspices of the Mining Section of the National Safety Council in St. Louis, June 25 and 26. The sessions were attended by more than 200 coal mine operators, miners, representatives of the Illinois Bureau of Mines and Minerals, representatives of the United States Bureau of Mines and others.

The general topics discussed were: "Haulage," "Mine Rescue," "Prevention of Explosions," "Safety Organization and Education" and "Protection of the Human Body."

In his talk on "Prevention of Haulage Accidents," Ralph D. Brown, Superintendent of the O'Gara Coal Company, Harrisburg, Illinois, outlined general safe practices which have been found practical in southern Illinois mines.

"Track construction must be adequate, as free from curves and excessive grades as possible and continuously maintained," he said. "Good tracks mean few derailments, few accidents and lower cost of operation. Arrange the development plan and change the course of entries and working places to eliminate adverse grades. Absolute control of the speed of cars and locomotives is essential to prevent accidents. Every mine has a haulage system peculiar to that particular mining condition, so that no set limit of speed may be established, except for man trips.

"Derailers should be placed on the low elevation end of every parting to prevent runaways. This applies both to mule and motor haulage. Cars at the face should be blocked to prevent them being set in motion by shots or other causes. Motor trips on grades should carry a pointed iron drag hooked into the draw bar to stop or derail a car if a coupling should break at any point in the trip. Regardless of the type of haulage, provide cars with adequate bumpers, not less than seven inches in length to provide a foot hold for the driver, and ample space to prevent the couplers and trip riders being squeezed. Keep roadways free of refuse and set the props back as far as possible."

The three points of attack in a campaign for elimination of haulage accidents, according to Mr. Brown, are:

1. The employment of proper engineering skill in designing comprehensive haulage system best fitted to meet the needs of particular mining conditions.
2. Proper inspection and maintenance of equipment as a function of the managing organization.
3. Efficient and honest management, including intelligent planning, skillful, rigid and diplomatic enforcement of rules. Educational and psychological study of human nature with the idea in mind of knowing and meeting the needs of employes and choosing those employes best fitted for a particular line of work.

Coal dust explosions can be controlled and practically eliminated by the use of permissible explosives, lamps and machinery, rock dust stemming and rock dusting of the mines, Thomas J. Fear, general superintendent, Inland Collieries Company, Indianola, Pa., told the delegates. Rock dusting mines not only decreases the possibility of dust explosions but also provides increased illumination resulting in fewer haulage accidents, he said.

Other speakers were Arthur T. Morey, Commonwealth Steel Company, Granite City, Illinois; Alex Miller, U. S. Bureau of Mines, Vincennes, Ind.; D. D. Wilcox, mine superintendent, Superior Coal Company, Gillespie, Illinois; James Towal, E. I. du Pont de Nemours & Company, Benton, Illinois; L. C. Isley, U. S. Bureau of Mines, Washington, D. C.; W. D. Ryan, U. S. Bureau of Mines, Kansas City; C. L. Colburn, U. S. Bureau of Mines, Pittsburgh, Pa.; Dr. H. G. Bristow, Professor of Chemistry, St. Louis University, St. Louis, and Dr. J. B. Moore, Benton, Illinois.

It was decided at the conference to establish a permanent committee to call together future conferences. This committee will be appointed by D. D. Wilcox.

Russell Byron Williams, of the Link Belt Company, Chicago, has prepared an interesting article on the "Storage of Bituminous Coal," in which he discusses five accepted methods of coal storage, which are by means of locomotive cranes, by means of bridge tramways, by means of the Dodge coal storage systems, by means of the power hoe, by means of portable belt conveyors. This paper covers the subject in a most comprehensive manner, and copies may be obtained upon request to the company.

Before long the picture of miners with black faces passing through the streets of Pottstown, Pa., will no longer be seen. A colliery has spent more than \$25,000 for facilities for miners.

METAL MINING DURING FIRST HALF OF 1924

Geological Survey Issues Mid-Year Reports—Lead In Advance Of Other Minerals—Drought And Labor Costs Reduce Gold Production — Price Of Copper Brings Curtailment In That Industry—Much Development Work Under Way

THE mid-year estimates of the U. S. Geological Survey on metal mine production just have been issued. According to these reports the Coeur d'Alene district has been most active, largely due to the advanced price of lead. The gold industry, while active in general development work, has been seriously handicapped by the drought which has been prevalent throughout the West. Copper production has been materially curtailed both in Arizona and Montana, although the Arizona producers have been quite active in the building of mills and smelters. The Magma Copper Company opened its new smelter at Superior, Ariz., in April, and the New Cornelia Copper Company increased its production through the completion of its new flotation plant which treats sulphide ores. The Anaconda Copper Mining Company, however, decreased production and in May closed its Tramway mine.

California

Activity That of Development Work Rather Than Production—Five Mother Lode Properties Deepening Shafts—Silver Production Curtailed on Account Extensive Development—Copper Production Increased—Lead Production Normal

Metal mining in California was rather active during the first six months of 1924, according to the Department of the Interior, as shown by reports received from the miners by J. M. Hill, of the San Francisco office of the Geological Survey. Most of the activity has been directed to the development of gold quartz mines rather than to production, for the output of gold and silver was less than in the first six months of 1923. Five of the large Mother Lode mines—the Argonaut, Plymouth, Shawmut, Central Eureka and Moore—are deepening their shafts. The placer output was small, because of drought; a large number of hydraulic properties in the Klamath and Sierra Mountains had almost no water and therefore made but small output. The dredges maintained production at about the normal rate, but fewer boats are working. The silver mines, particularly the California Rand, curtailed production in order to carry on extensive development. The lead producers in the southern part of the state have apparently been working at the normal rate. The production of

copper has been further increased; the rate during the first six months of 1924 was about 4,000,000 pounds a month. The work of development at the Engels mine may restrict the output there during the rest of the year.

In Amador County the Kennedy, Argonaut, Moore, Plymouth and Central Eureka mines are keeping well up with their operations, and several small properties are being developed. In Butte County the output is, as usual, largely made by dredges, but some quartz properties are being reopened. The largest operations in Calaveras County are at the Calaveras copper mine, whose plant at Copperopolis is active, and at the Carson Hill mines, at Melones, but many smaller properties are being operated, notably the Finnegan, Easy, Lamphear, Glenn & Rigney, Wolverine, Ford, Golden Eagle, Hesperides and Victor. In Eldorado County the Guilford, Ingraham, Sliger and Hines-Gilbert were in operation. In Inyo County the Darwin and Estelle mines were productive, but the Slate Range was idle. The gold mines east of Lone Pine were being further developed. In Mariposa County the Princeton mine was productive, and some of the old mines on the Mariposa Grant were being worked. At Blind Springs, in Mono County, the Comanche Mining and Reduction Co. has done considerable development work. In Nevada County there has been a continuation of the active development of many properties in the Grass Valley section, where at least sixteen mines are productive. The North Star and Empire have been operated about as usual, and rich ore has been found at depth at both properties. The Ben Franklin and Golden center mines have entered the producing class, and several mines that have been producing have temporarily curtailed their output during development. The Idaho Maryland has added 20 stamps to its mill and has carried on extensive development, which has given good results. This renewed activity at Grass Valley has created additional interest in all the surrounding territory.

The Engels Copper Co., in Plumas County, has floated a \$500,000 bond issue to finance further development and exploration, which will include the development of the Engels ore bodies between the seventh level and the new tunnel No. 10 level, and the running of a new level at the Superior mine. At

the Walker mine additional ore reserves have been proved on the 600-foot level, and the new flotation mill is making high recovery.

In the Rand district, San Bernardino County, the California Rand has reduced production in order to develop the property more fully. At French Gulch, in Shasta County, several gold properties are working, and the Mammoth smelter has two furnaces in continuous operation at Kennett. Alleghany, in Sierra County, continues to be the scene of considerable activity, the Sixteen to One, Plumbago, Tightner, and Kate Hardy producing regularly.

In Siskiyou County the hydraulic mines were short of water, but several quartz properties were under development, notably the Victory, Advance and Buzzard Hill mines, near Snowden and Happy Camp. In Trinity County four dredges were in operation, but the hydraulic mining was small and few quartz properties were worked.

The Shawmut mine, in Tuolumne County, was turned back to the Eagle Co. by the Tonopah-Belmont Company, but work was continued by the owners. The Harriman, App, Rawhide and Clio Vindicator were also actively mining and several smaller properties were under development.

Arizona

Copper Output Will Probably Not Exceed 1923 Production—Many Large Mines Curtailing Production on Account of Price of Metal—Gold and Silver Production Shows No Increase

A statement issued by the Department of the Interior, based on statistics collected by V. C. Heikes, of the Geological Survey, shows that there was no great general increase in the production of metals in Arizona during the first half of 1924, and that the output of some copper mines was curtailed. The value of the metal in output in 1923 was \$104,301,200, or nearly 66 percent more than in 1922, but the value in 1924 will probably not exceed that in 1923, as the present price of copper is close to the cost of production at many of the large mines.

The value of the output of gold in Arizona in 1923 was \$6,121,121, as compared with \$3,524,134 in 1922. The output of gold in the San Francisco (Oatman) district in 1923 was \$2,796,830, or nearly 46 percent of the total for the

state, and gold obtained from copper ore was valued at \$2,205,503. Several of the large copper producers, such as the Copper Queen, United Verde, and Calumet & Arizona mines, are continuing to contribute enormously to the output of gold, but the production of the mines at Oatman is seriously decreasing. The United Eastern Mining Company, which for years was the largest producer of gold in Arizona, has reported that its ore body is exhausted, and the Tom Reed mine is being operated on a lease. Part of the decrease may be offset by the operation of the cyanide mill just completed for the Telluride mine at Oatman.

The output of silver in 1923 was 7,343,742 ounces, an increase from 4,531,864 ounces in 1922, despite the drop in the price of silver to an average of 82 cents an ounce. The total production of silver in Arizona for 1923 represents a new high record for the state, which is due largely to the unusual increase from the United Verde mine. This mine not only took first place as a producer of silver but made an output of silver that far exceeded that of any other mine in Arizona. Besides the usual silver producers, the Shattuck, Signal, Superior & Boston, and Magma mines contributed largely to the output of silver. In the first half of 1924 the shipments of silver ore from Tombstone decreased greatly, and somewhat less silver was obtained from copper ore.

The output of copper in 1923 was 618,928,602 pounds, valued at \$90,982,504, an increase from 400,043,128 pounds in 1922. The large producing mines could easily increase the production of copper in 1924, but the price of copper has rather suggested the need of curtailment, and the plant at Humboldt was closed in February. Unusual interest, however, was shown in the construction of mills and smelters. The output of the New Cornelia mine, at Ajo, was increased as a result of operations of the new flotation plant, which treats sulphide ore, and a decided increase was made in concentrates shipped from the new Copper Queen concentrator, at Don Luis, as well as from the improved No. 6 concentration plant, at Morenci. The Magma smelter, at Superior, produced its first copper bullion in April, and the Ray Consolidated Copper Co. increased its shipments of concentrate and was improving the mill. Much interest was shown in heap-leaching, which is said to be successful at both Bisbee and Jerome.

The output of lead in 1923 was 16,291,548 pounds, an increase from 15,070,894 pounds in 1922. The price of lead increased from 7 cents a pound in 1923 to an average of 8.5 cents in the first quarter of 1924. Four mines—the Copper Queen, Seventy-nine, Shattuck

and Signal—produced more than 1,000,000 pounds of lead each in 1923. The shipments of lead ore from the Shattuck have increased in 1924, but those from the Copper Queen have decreased. In the California district the Hilltop mine was making regular shipments of lead ore.

The output of zinc in 1923 was 519,103 pounds, but no shipments were reported early in 1924.

Dividends were paid during the first five months of 1924 by the United Verde Extension, Miami, Phelps Dodge, Inspiration, United Verde, Calumet & Arizona, United Eastern, New Cornelia and Arizona Commercial companies.

Idaho

All Large Mines in Coeur d'Alene Active for First Time in Several Years—Steady Gain in Production Throughout the State

A steady gain was made in the production of metals in Idaho during the first half of 1924, according to a statement issued by the Department of the Interior, which is based on statistics compiled by C. N. Gerry, of the Geological Survey. The value of the output in 1923 was \$26,510,524, an increase from \$18,031,555 in 1922. All the large mines of the Coeur d'Alene district, except the Callahan Lead-Zinc property, are active for the first time in several years, and many of them are producing at the maximum rate, spurred on by better market conditions. The price of lead, which largely controls mining in Idaho, increased from an average of 7 cents a pound in 1923 to about 8.5 cents a pound early in 1924. The resumption of mining at the Hecla property induced the Bunker Hill smelter to blow in another lead furnace, and the lead plant at East Helena, Mont., is evidently running at increased capacity.

The gold produced in Idaho in 1923 was valued at \$767,427, of which \$498,709 was obtained from placers. The most productive placer mining was that done by dredges at Murray and Featherville. The output of gold from siliceous ore, especially from the Gold Hill & Iowa property, decreased decidedly. No great increase in gold is indicated for 1924, though the dredges are active, and several new mills are ready to operate. In 1923 the largest gold producers were the Yukon Gold Co., at Murray; the South Park Dredging Co., at Featherville, and the Gold Hill mine at Quartzburg. Considerable gold came from copper-lead ore produced at the Talache property, Bonner County, and from copper ore of the Idaho Metals mine at Mackay.

The production of silver in Idaho in 1923 was 7,673,662 ounces, an increase

from 6,081,865 ounces in 1922. In spite of the comparatively low price of silver, which was about 64 cents an ounce early in 1924, the large producers of silver-lead ore were unusually active on account of the increase in the price of lead. The yearly output of silver has been somewhat below normal since 1918, but if shipments of ore continue at the present rate a normal quantity of more than 8,000,000 ounces will probably be produced in 1924. Some of the mines that are making notable increases are the Hercules, Tamarack & Custer, Morning Hecla, Success, Latest Out, Wilbert, Stratton and Sunshine. The Talache mine, in Bonner County, decreased its output, but a mill was moved to the Hewer property in the Lakeview district, and rich silver concentrate was being shipped from the Precious Metals mine in the Flint district, Owyhee County.

The output of copper in Idaho in 1923 was 3,979,631 pounds, an increase from 3,282,842 pounds in 1922. The Idaho Metals Co., at Mackay, was shipping at the rate of about 1,200 tons of copper ore a month early in 1924. In Lemhi County the quantity of concentrate shipped from the Harmony property decreased considerably. The Pope Shenon mine made an increased output of sulphide concentrate, but in May the ore mined was oxidized, which rendered simple concentration inadequate. The Talache mine in Bonner County produced some copper as well as silver in 1923, but shipments were decidedly less in 1924.

In 1923 the mines of Idaho produced 242,355,733 pounds of lead, an increase from 195,834,205 pounds in 1922. The large producers of lead were approaching a normal rate of production in July, 1923, when the fire at the Hecla plant stopped production from that large producer. In January, 1924, mining was resumed at the Hecla, and as the price of lead increased, other lead producers were making normal shipments. Notable increase was being made at the Hercules, Tamarack & Custer, Hunter, Sunshine and Success mines. The Tamarack & Custer mine is now opened at depth by the Mammoth tunnel, and the mill will probably be enlarged. A large new ore body was opened by the Ajax Mining Co., at Burke, and as the ore occurs in claims recently purchased from the Hercules Co., mining and development may be done through Hercules ground. In Lemhi County the Latest Out mine made a good record, but the output from the Pittsburgh Idaho was small. In Butte County the Wilbert Mining Co. resumed shipments, but the output of lead ore from Blaine County was considerably less.

The output of recoverable zinc in

Idaho in 1923 was 27,952,749 pounds, an increase from 4,109,131 pounds in 1922. The output of zinc was below normal, as the Callahan Lead-Zinc Co., the largest producer, was active during only three-quarters of the year. In 1924 no increase is expected, as the Callahan mine is idle. There was, however, considerable activity at the other mines which produce zinc ore. The Morning and Success mines were shipping concentrate at an increased rate to the electrolytic plant at Great Falls, Mont., and the revamped mills of the Nabob and Constitution mines in Pine Creek were also active in April.

Dividends were paid in the early part of 1924 by the Bunker Hill, Federal, Hecla, Hercules and Tamarack & Custer companies.

Montana

Price of Copper Curtails Production—Output of Gold, Silver and Zinc Considerably Less Than 1923

The production of copper, lead and zinc in Montana was proceeding at a somewhat better rate early in 1924 than in 1923, according to a statement issued by the Department of the Interior, based on statistics compiled by C. N. Gerry, of the Geological Survey. The output of gold, however, was decidedly less and many of the silver mines had ceased operations. The price of lead was high and averaged about 8.5 cents a pound from January to May, but the prices of silver, copper and zinc decreased and were much less than those of 1923. Copper at 12.5 cents a pound is not considered encouraging for deep mining at Butte, and the Anaconda Copper Mining Co. decreased its output in May by closing the Tramway mine and by curtailing operations at the Colorado mine which was recently acquired from the Davis Daly Co.

The gold produced in Montana in 1923 was valued at \$1,758,748, an increase from \$1,656,757 in 1922, in spite of the fact that no dredges were at work in Madison County. A large part of the gold came from the property of the Anaconda Copper Mining Co., at Butte; the Ruby Gulch mine, near Zortman; the Shannon mine, at Marysville; the Jardine mine, near Gardner; and the Swissmont mine, at Elkhorn. A large decrease will no doubt be recorded in 1924, as the Ruby Gulch, Shannon and Swissmont mines are idle. The Jardine mine, however, is maintaining a large output of gold both from bullion and from roasted concentrate. The output of gold from silver ore in Granite County and from iron ore in Deer Lodge County is decreasing considerably.

The output of silver from Montana in 1923 was 13,380,862 ounces, an

increase from 12,468,151 ounces in 1922. In the early part of 1924 the Anaconda, Butte & Superior and Elm Orlu companies made a good record from copper and zinc ore containing silver, but several other companies were discouraged and ceased operations when silver dropped to about 65 cents an ounce. The Champion mine, in Deer Lodge County, and the Western Metallurgical Co., at Elkhorn, are idle; shipments of silver from Philipsburg are slight, and those from Neihart greatly reduced. The Goldsmith and Minnie Jane mines, at Butte, produced considerable rich silver ore and materially increased their shipments.

The output of copper in Montana in 1923 was 224,125,264 pounds, valued at \$32,946,414, as compared with 165,754,442 pounds, valued at \$22,376,850, in 1922. Though the price of copper was only 12.77 cents a pound in May, 1924, and the North Butte mine was idle, copper was being produced at the rate of about 21,000,000 pounds a month early in 1924, as compared with nearly 19,000,000 pounds a month in 1923. The East Butte Copper Co. continued to operate the Pittsmead smelter, at Butte, though ore receipts were curtailed by the sale of the Davis Daly property to the Anaconda Co. The Butte & Superior Mining Co. is now shipping copper ore to Anaconda regularly, and is producing about 1,000,000 pounds of copper a month. The new 300-ton mill of the Jib Mining Co., at Basin, was active in March, and concentrate containing gold, silver, copper, and lead was shipped. An increased quantity of copper-lead concentrate also came from the Silver Dyke mill, near Neihart.

Montana produced 35,945,623 pounds of lead in 1923, an increase from 29,767,479 pounds in 1922. Most of the lead was recovered from lead-zinc ore and zinc ore mined at Butte, and there was a decided increase in both classes of ore during the first half of 1924. Besides the ore from the Butte mines a large quantity of lead ore and concentrate was being marketed from the Snow Storm and Lukens Hazel mines, in Lincoln County; the Angelica and Jib mines, in Jefferson County; the Silver Dyke mine, in Cascade County; and the Sterling mine, in Lewis and Clark County. Considerable lead slag from the old Hecla smelter dump was shipped through Melrose.

The output of recoverable zinc in Montana in 1923 was 141,460,392 pounds, an increase from 119,069,818 pounds in 1922. Early in 1924 the companies owning zinc mines at Butte were making every effort to exceed the record made in 1923, but if the price of zinc continues to decrease the rate may not be maintained. The price of the metal

decreased from 6.75 cents a pound in February to 5.79 cents in May. Much zinc ore is being milled in the Timber Butte custom plant, at Butte, but the ore from the Butte & Superior mine was milled at Anaconda, and the concentrate roasted and leached at the electrolytic zinc plant of the Anaconda Co., at Black Eagle, near Great Falls. This plant was making approximately 7,000 tons of zinc a month, but part of the ore came from the Coeur d'Alene district in Idaho.

The Anaconda Copper Mining Co. paid a dividend of \$2,250,000 in January, but passed the dividend in April.

Nevada

Copper and Zinc Production Increases—Loss of Production Caused by Low Price of Silver Offset by Steady Operation and New Milling Activities.

During the first six months of 1924 many mines in Nevada made an increase in the production of copper and zinc, according to statistics compiled by V. C. Heikes, of the Geological Survey. The drop in the price of silver to about 65 cents an ounce has seriously affected some mines at Tonopah, Rochester and Candelaria, but the decrease is in part offset by steady operations or new milling activity in other districts. In 1923 the value of the metals produced was \$25,040,349, an increase from \$15,705,609 in 1922. As the prices of metals in June, 1924, were less than the average prices in 1923, no large increase in production can be expected during 1924.

The value of the gold mined in Nevada increased from \$3,297,384 in 1922 to \$4,223,109 in 1923, a gain due in large part to an increase in the output of mines at Virginia City and Ely. The Tonopah, Comstock, Robinson, Jarbidge, Manhattan, Round Mountain and Rochester districts each produced more than \$100,000 in gold in 1923. The largest producers of gold were the United Comstock, Nevada Consolidated, Tonopah Extension, Elko, White Caps and West End mines. Early in 1924 the United Comstock, Nevada Consolidated and Tonopah Extension mines were making a larger output, but many other large gold producers were not so fortunate. Mining in the Tonopah district, which produced gold valued at \$1,107,329 in 1923 and \$1,179,302 in 1922, has been somewhat less active in 1924, according to the records of the monthly shipments of bullion. The shipments of ore from Goldfield are increasing, and new mills are ready to operate at Jarbidge, Virginia City and Unionville, but no dredging was done in 1924, and milling at the White Caps mine at Manhattan was impeded by the quantity of antimony in the ore. The Great Western mine, in

the Rochester district, is producing considerable gold regularly, though the milling plant is small.

The production of silver in 1923 was 10,614,564 ounces, an increase from 8,619,587 ounces in 1922. The Tonopah Extension, United Comstock, West End, Tonopah, Tonopah Belmont and Betty O'Neal mines each produced more than 500,000 ounces in 1923. Early in 1924 the Tonopah Extension and the United Comstock upheld their records, but the output from the Betty O'Neal, Tonopah, West End and Rochester Silver mines was much less, and the Candelaria mine was idle. In 1923 the Tonopah district produced 5,176,306 ounces of silver, against 5,436,080 ounces in 1922, and a further decrease is probable during 1924. The deposits at Tonopah were discovered in 1900 and from 1901 to 1923 the district produced metals valued at more than \$132,000,000. Its largest yearly output, which was valued at \$9,598,733, was made in 1913. Mining and development work continue, and new ore bodies are being opened, but the greater part of the district has been thoroughly prospected and most of the ore mined. The United Comstock is not only making an unusually large output by treating low-grade ore, but the company's operations are becoming profitable, according to its last quarterly report. The Consolidated Cortez Silver Mines, in Lander County, shipped much more bullion and concentrate in 1924 than in 1923, and some of the producers of silver-lead ore are also increasing their shipments.

Nevada produced 67,204,282 pounds of copper in 1923, an increase from 23,133,091 pounds in 1922. Nearly all the copper was produced near Ely, in White Pine County, in 1923, but some of it came from Eureka and Lincoln Counties. Early in 1924 the Nevada Consolidated Copper Company was milling about 280,000 tons of copper ore a month, and the shipments of copper bullion, including copper from custom material from the property of the Consolidated Copper mines, increased about 25 percent.

The output of lead in Nevada increased from 9,389,182 pounds in 1922 to 18,156,337 pounds in 1923. Lincoln, Mineral, White Pine, Clark, Eureka and Elko Counties each produced notable quantities of lead. The largest producers were the Simon, Prince Consolidated tailing dumps, Virginia Louise, Bristol, Combined Metals and Yellowpine mines. Early in 1924 increased shipments were made from the Ward, Spruce Monarch, Yellowpine and Eureka Holly mines, but there was a decided decrease from the Virginia Louise, Simon and Leadville mines. New mills were operated at the Mendha mine in Lincoln County, and the Eureka Holly

at Eureka. Much tailing was shipped from Pioche, but the supply is nearly exhausted.

The output of recoverable zinc increased from 2,618,710 pounds in 1922 to 14,166,550 pounds in 1923. The operations at the Yellowpine mine, Clark County, were most extensive in 1923, and a large quantity of zinc ore and concentrate was taken from the Simon mine, in Mineral County, and the Combined Metals mine, in Lincoln County. Though no shipments were made from the Simon mine during the first half of 1924, the total shipments of zinc are greater, for the mines of the Yellowpine district are contributing about 1,500 tons of ore and concentrate a month. From the Combined Metals property, at Pioche, crude ore has been shipped to Florence, Colo., and mill ore to Bauer, Utah, for treatment in the new 200-ton flotation plant.

During the first five months of 1924 dividends were paid by the Tonopah Extension Mining Company and the Tonopah Mining Company.

Utah

High Rate of Production in Copper and Lead Shown—Silver Output Decreased—Gold Shows Advance.

The shipments of ore from mines in Utah during the first half of 1924 indicate a high rate of production of metals, especially of copper and lead. As the prices of metals other than lead were much larger in 1924 than in 1923, the production may be considerably decreased before the end of the year.

The value of the output of gold, silver, copper, lead, and zinc in 1923, was \$66,472,911; the value in 1922 was \$40,424,199. Early in 1924 lead ore was being actively produced by the mines in the Park City district and copper ore was being produced at Bingham at an increased rate, but the output of silver ore in the Tintic and other districts of Utah was much less during the early part of the year than in 1923.

Gold valued at \$3,076,483 was produced in Utah in 1923, as against \$2,296,855 in 1922, the increase being due in large part to the activity of the producers of copper ore. The Bingham mines produced gold valued at \$2,064,141 in 1923; the Tintic mines \$531,344; the Park City mines, \$187,779 and the mines in Piute County, \$162,623. During the early part of 1924 there was an increase in the output of gold associated with copper ore but no increase in that of the total gold from all sources, as the output of ore containing gold and silver was curtailed. The Deer Trail mine, in Piute County, the only mine in the State that produces bullion from cyanide

operations, was practically closed early in 1924, and the mill was idle.

The output of silver in Utah in 1923 was 19,137,470 fine ounces, a record for the State and an increase from 17,271,100 ounces in 1922. During the first five months of 1924 the decrease in the production of silver has been pronounced, on account of the drop in its price, which averaged about 64.5 cents an ounce. Several silver mines have been seriously affected by this drop. The Vipont mine has not been operated since purchases under the Pittman Act were stopped, and other large producers have greatly curtailed their output. A marked decrease was shown in the shipments from the Tintic district (largely siliceous silver ore), the shipments from the Park Utah mine were below normal, and even the shipments of silver-lead ore from Bingham were decidedly less. At Eureka the shipments from the Chief and Gemini mines were less than half those for the same period in 1923. Production from the Grand Central mine was greatly decreased, and the Tintic Milling Co. was idle. The Tintic Standard Mining Co., at Dividend, was not greatly affected during the six months' period, and though less ore was milled considerably more first-class ore was smelted.

The production of copper in Utah in 1923 was 222,393,572 pounds, as compared with 97,193,850 pounds in 1922. The Utah Copper Co., at Bingham, the largest producers of copper in the United States, was producing at the rate of about 18,500,000 pounds of copper a month during the first quarter of 1924 and even exceeded this rate later. Both the Arthur and Magma mills which are now fully equipped for flotation as well as for gravity concentration, were making a much better saving than in 1923 and showed no signs of curtailment. The Ohio Copper Co. has increased its shipments of copper precipitates obtained by leaching ore in place, and is making an output of about 800,000 pounds of copper a month. The Utah Consolidated Copper Co. was milling 1,100 tons of ore a day at International and was producing 1,000,000 pounds of copper a month from January to May, but curtailed its output about 50 percent in June. The Montana Bingham mine, which produced much iron-copper ore in 1923, made no shipments early in 1924.

The output of lead in Utah increased from 135,332,144 pounds in 1922 to 203,447,793 pounds in 1923. The price of lead, which reached 9 cents a pound in March, has stimulated production in the Park City region, but the lead mines of Tintic and Bingham were producing at a greatly reduced rate. The United States Smelting, Refining & Mining Co., and the Utah Apex Mining Co., at Bingham

ham, have done considerable development work, but the shipments of ore and concentrate are considerably less. The Chief Consolidated Mining Co., in the Tintic district, produced much less ore but made progress in the construction of its mill at Eureka. The shipments of lead ore and concentrate from the Park City district have increased measurably from the Keystone, Park City group, and Silver King Coalition mines. The Keystone has become a shipper of about 1,500 tons of crude ore and concentrate a month. The three lead smelting plants at Murray, Midvale, and International were active, and though the total bullion produced was probably less, the shipments from the International plant were larger.

The output of recoverable zinc in Utah increased from 5,119,410 pounds in 1922, to 11,330,913 pounds in 1923. No increase is indicated for 1924, but shipments of zinc ore and concentrates are made regularly from the Park City group at Park City and the United States and Niagara mines at Bingham.

Dividends announced in the first part of 1924 were paid by the Utah Copper Co., Silver King Coalition, Park Utah, Tintic Standard, Park City, Chief Consolidated, Iron Blossom, and United States companies.

Washington

Improvement in Lead Production—But Other Metals Decrease Production—1923 Output Normal

During the first half of 1924 the mines of the State of Washington were responding slightly to the improved market for lead ore, but were producing less gold, silver, and zinc, according to a statement issued by the Department of the Interior, based on statistics compiled by C. N. Gerry, of the Geological Survey. The value of the output of metals in 1923 was \$1,065,666, an increase from \$580,808 in 1922, and according to the records of the last decade, the output for 1923 was normal. In 1923 36 mines produced \$342,067 in gold, 227,187 ounces of silver, 871,999 pounds of copper, 2,906,479 pounds of lead, and 3,024,535 pounds of recoverable zinc.

The production of gold depends largely on siliceous ore from Republic and gold bullion from Whatcom County. The camp of Republic is active and the Surprise, Knob Hill, Last Chance and Quilp mines are being developed at greater depth, but shipments of ore have decreased from 2,000 tons to 1,700 tons a month in the first part of 1924. Only an occasional shipment is made from the Surprise and Old Republic mines, but shipments are steadily increasing from the Last Chance and Quilp mines. The

Quilp property is said to have a body of ore 12 feet wide, which is being opened at a depth of 1,000 feet.

The production of silver in Washington in 1924 will probably be less than it was in 1923, unless shipments of ore from Republic are greatly increased. At Chewelah, in Stevens County, the production of copper ore containing silver is decidedly less, and the Ruby mine, near Oroville, is idle. The Dominion mine, near Colville, has shipped some rich ore containing galena and native silver, and silver-lead ore is being developed at the Chloride Queen mine, north of Colville.

The Sunset Mines Co., in Snohomish County, the largest producer of copper in Washington in 1923, resumed shipments of copper concentrate in April. The shipments from the United Silver Copper property at Chewelah, which are steadily decreasing, were much less than those made in 1923.

The lead mines of Washington will probably make a greater output than they made in 1923 if the present rate of shipment is maintained. The Gladstone property, near Northport, is shipping about 400 tons of lead ore a month, and the Santa Rita mine, west of Springdale, and the Bella May, at Metaline, are also contributing. Several silver-lead mines in Stevens County are being developed and are preparing to ship ore or concentrate, but the Electric Point mine near Northport is still idle.

The Washington-Black Rock mine in Stevens County, which shipped much zinc ore to Trail, British Columbia, in 1923, curtailed shipments considerably in 1924.

Colorado

The total value of gold, silver, copper, lead and zinc produced in Colorado in 1923 was \$18,170,647, according to official figures by the U. S. Geological Survey.

Through its large production of gold, Teller County, which includes Cripple Creek, led all other counties of the state. It produced 195,866 ounces of gold, worth \$4,048,906. Silver brought the Teller County total to \$4,067,468.

San Miguel County led in silver production with 1,982,007 ounces valued at \$1,625,246, and in copper with 1,625,246 pounds valued at \$211,281.98. It was second as a gold producer, with 66,100 ounces valued at \$1,366,404. The Tomboy and Smuggler Union mines were the chief contributors.

San Juan County was the leading lead producer with 10,378,156 pounds valued at \$726,471. The Sunnyside mine was the leading producer.

Eagle County leads in zinc, producing

23,600,000 pounds of that metal, valued at \$1,604,800.

Oregon

Prospects Indicate 1924 Production Will Be Larger Than 1923—Scant Water Supply Hampers Production

The mining industry in Oregon during the first half of 1924 was handicapped by extremely low water, yet the quantity of gold and silver produced in the state during that period was somewhat larger than that produced during the similar period of 1923, according to the Department of the Interior, as shown by information supplied by the miners to J. M. Hill, of the San Francisco office of the Geological Survey. The prospects indicate that the output for the year 1924 will be greater than that for 1923. Copper mining was affected by the continued low price of the metal, but the production of the largest copper mine seems to have been well maintained.

In southwestern Oregon water was scant and the placer mines made only a short run, but development was continued on several quartz properties, notably the California mine, at Mount Reuben, and the Millionaire and Sylvania mines, near Gold Hill. Milling has been done at two properties in the Galice district, at three in the Rogue River district, two in the Gold Hill district, and one each in the Applegate, Chetco, Holland and Lower Rogue districts. It is reported that a 25-ton sampler will be put in commission about the middle of July at Gold Hill, which should make possible the operation of many small deposits, whose size does not warrant the construction of individual mills.

In southeastern Oregon the Sumpter Valley smelter has apparently discontinued work, and it is reported that there is now no local market for ores because the supply of ore is so small. Three dredges in this region have been doing profitable work. The new dredge of the Superior Co., at Bridgeport, after digging for some time in relatively poor ground, moved to the more productive part of its holdings before midyear. There was a little pocket-hunting in the Prairie City and Canyon City districts. At Granite the Independence and Buffalo mines have been milling. The Baisley mine has been doing some work, and development has been under way at the copper deposits near Keating. In the Mormon Basin region the Gorman and Phelan mines have been in operation. The Cornucopia and Iron Dyke mines have been operated about as usual. Production from the Bay Horse mine was apparently somewhat curtailed during development, installation of electric power and mill construction.

COPPER DUTY BILL INTRODUCED

Michigan Congressman Says Industry Needs Tariff—Duty Endorsed By Operators In Michigan—No Action Taken On Measure

THE why and wherefore of a duty do not stop operations entirely and wait better prices, Mr. James said deep mining cannot "mark time." "You cannot close a copper mine like the door of a store," he said. "With a close-down in a mine comes rapid deterioration, loss of organization and prohibitive cost of maintenance. Most of the companies operating today are doing so merely because in self-protection they have chosen the lesser of two evils. If the present situation is protracted it must lead to permanent abandonment."

COPPER NEEDS DUTY

He said that the copper duty is endorsed generally by Michiganders irrespective of political belief. His bill was introduced at the direct request of G. R. Campbell, of the Calumet and Arizona Mining Company. Mr. James in his address to the House said he feared that unless the industry is given help that most copper mines will be forced out of business and will never be reopened. He quoted a letter from Senator Ferris, Democrat, of Michigan, to the effect that the copper duty bill "is justifiable." Mr. James said the present situation in Michigan is duplicated to a greater or less extent in every copper district in the country, particularly high cost mines. While Michigan was the leading copper producing State in 1850 it now produces only 10 percent of the country's output. He said the copper industry did not share in war profits as did other industries, as the Government fixed price was off-set by the increased cost of production. Conditions growing out of the war have caused a drop of from 16,000 to 4,000 in the number employed in Michigan copper mines. Mr. James stated that during the past few years copper mining companies have operated at a loss with reduced surplus and working capital and depletion of ore reserves. While a few years ago copper companies paid millions of dollars federal taxes, today most companies are paying no taxes because of lack of profits.

"The direct cause of demoralization of the copper mining industry in the United States is the inability of a majority of companies to produce copper at a cost below the selling price," said Mr. James. "Copper is practically the only commodity which is selling at less than pre-war prices. Copper is now selling at from 13 to 14 cents per pound, in spite of the fact that the United States is consuming more copper than ever before."

Answering the question why the mines

Mr. James said that in order to give the copper mining industry sufficient protection to enable it to live, it must have a tariff duty of 6 cents per pound. In stating that a copper tariff is not new Mr. James said copper bore a duty from 1861 to 1894. He said that for six years copper producers have been hoping that Europe would demand copper in large quantities. While domestic consumption has now practically reached domestic production, he said the domestic market no longer belongs to the domestic producer. Foreign production and exportation to the United States have increased so enormously within the last five years that the foreign producer is practically dominating the American market. He said that from 1920 to 1923 imports of brass have exceeded exports of brass and bronze, because of the large movement of brass scrap from Europe to American smelters and consumers. The country is using more copper than it is producing. He gave various statistics on copper, including the production and cost per pound of American companies for 1912 and 1923. They showed an increase in production costs of from 33 to 50 percent. Some companies are now working only the richest portions of their ore deposits. For other groups of mines cost increases have been from 134 percent to 150 percent.

NO NEW DEPOSITS

Mr. James pointed out that for many years there has not been a major producer of copper developed within the United States outside of the known copper districts, while during the past ten years new copper deposits have been developed in foreign countries, particularly South America and Africa, where the production is high and the deposits almost inexhaustible and more easily worked than deep mines of the United States. Cost of production in foreign mines is from 6 to 7 cents per pound

cheaper than in the United States. Almost the entire foreign production is for export. "This cheaply produced copper is now pouring into this country in ever increasing quantities, and in the absence of direct protection this foreign production will gain entire control of the American market," said Mr. James. "American mines cannot meet this competition. They must bear taxes, which is no small factor in the cost of operation. Every argument that has been made in favor of a tariff on other American commodities can be advanced in favor of a tariff on copper. A tariff will not only produce a large revenue directly from the importer of copper but will restore a large taxable asset in this country."

Mr. James pointed out that the copper content of rock mined has increased over that of ten years ago. This is not an indication of increasing richness with depth, but is due to the fact that under present conditions only the richest areas can be mined without substantial loss. Under normal conditions areas carrying fifteen pounds of copper per ton of rock have been mined in Michigan at a profit and an average of one percent, or twenty pounds of copper per ton of rock was an assurance of dividends. Areas of this character are now being left in place. At normal places leaner areas can be mined, but Mr. James said copper will never reach a selling price within the life of these mines which will permit of going back, reopening the abandoned stopes, and recovering the lean areas when the richer portion of the vein has been mined. It is physically impossible to go back and mine areas which have once been abandoned. "Thus day by day we see the copper resources of the country disappearing forever," he said.

EQUALIZE COST

Mr. James said the copper tariff will equalize the cost of production in the United States and abroad, provide revenue and conserve resources. He saw no reason why the copper mining industry should not share in tariff protection. The bill is designed to enable mining companies to pay a living wage, to give back to owners of copper mines a small part of their investment and to protect the copper industry from ruin by foreign competition. Mr. James said that last year over one-third of the copper consumed in the United States came from abroad. While copper consumption in this country has doubled since 1913, pro-

duction has increased only one-fifth. Production this year may decrease owing to curtailment in output recently decided on by some Montana, Michigan and Arizona mines. The country is not producing as much copper as it needs for home consumption. For a generation or more the United States was Europe's main source of copper. Prior to 1914 America produced two pounds of copper for each pound required by American

consumers. The United States no longer has an exportable surplus of copper. We may soon be dependent on foreign countries for a large part of our copper supply.

Mr. James said he did not ask for a monopoly for American copper mines or that they be placed in position so they could charge an excessive price. Nor did he ask that they be favored so that they could pay large dividends.

explosives was offering 625 strengths, 40 diameters, 14 lengths of six styles of dynamite—or a possible 2,100,000 varieties. By standardization this was reduced to 1,500 varieties.

"A farsighted producer of men's shoes has reduced from three grades and 2,500 styles to one grade and 100 styles, eliminating 98.7 percent of their former diversity. They have decreased production costs 31 percent, inventory 26 percent, and cost to consumer 27 percent. They have increased turnover 50 percent, sales on women's shoes 22 percent, on men's shoes 80 percent.

"The Conservation Division of the War Industries Board arbitrarily reduced varieties in many lines. Thus in the farm implement field, the variety was reduced from 1,092 to 137. The president of the John Deere Plow Company has stated that standardization has saved his firm \$10,000,000 since the war.

"The need for simplification of electrical instruments became manifest early in the war. The Navy particularly was greatly handicapped by the great diversity of instruments for use on ship-board and for radio applications. Replacement units were hard to obtain because each manufacturer had his own standards, none of which would fit even roughly a panel of another make. This condition resulted in a naval purchase specification, which standardized sizes of case, capacities, essential mounting features and quality requirements for navy use. This has been followed by standardization along similar lines for army and other governmental applications. The A. I. E. E. Instruments and Measurements Committee is actively working on the same problem. To date the navy specification is probably the most comprehensive attempt in this direction, and is based upon sound fundamental facts.

"This is only a single example of many such attempts toward simplified practice in the electrical industry. It is urged that users of electrical apparatus familiarize themselves with the work of the Department of Commerce and the various manufacturers along this line and, recognizing that they themselves are the principal gainers, assist in the attempt to reduce to a minimum, by means of simplified practice, what would otherwise become a tremendous economic waste."

STANDARDIZATION ENDORSED*

"**T**O the average purchaser of electrical equipment the term 'standardization' is likely to awaken a certain amount of resentment on account of its seeming restrictive or compelling sound. It may appear as though the manufacturer is attempting to enforce his ideas upon the industry to his sole advantage, and that the holder of the purse strings is not permitted to have the say as to what type of apparatus he buys. As aptly expressed by W. A. Durgin of the United States Department of Commerce 'The user sees a world where we will all live in identical houses, where the shade trees will all be alike, the only difference between a Rolls-Royce and a Ford a matter of size, where we will all talk and dress identically, etc.'

"This sort of feeling is often encountered when a manufacturer's representative recommends a standard article in place of a special arrangement suggested by an operating official. We have in mind a recent case where an important operator intimated his resentment at a manufacturer's plea for the use of a standard article, emphasizing his opinion that the manufacturers were riding to a fall in attempting to say what the purchaser should buy.

"Mr. Hoover says we should not talk standardization—that we do not mean 'standardization.' What we have in mind is 'simplified practice'—the reduction in variety of sizes, dimensions and the immaterial differences in commodities as a means of eliminating waste, decreasing costs, and increasing profits and production."

"Over-diversification is one of the greatest sources of waste in any industry. It is gradually becoming recognized by the operating users of electrical apparatus that simplified practice or standardization to elimi-

nate this waste is exceedingly important. It should also be recognized that the industry as a whole, and not the manufacturers only, should promote and guide such standardizations through their various organizations, in the directions most desirable for the user.

"With such action by organizations in the electrical industry, there would not be any feeling of resentment on the part of individual users within the industry in opposition to the general idea of simplified practice, or to the use of the equipment resulting from such simplification. The users should go further and actually discourage the irresponsible maker seeking to develop apparatus whose whole motive is that it is different from existing practice, especially where such differences offer no real advantage, being often a mere talking point or an obvious attempt to pander to some individual ideas, while disregarding the broader requirements of the industry as a whole. Such devices are generally not based upon fundamental studies of requirements and are likely to be short-lived.

"As the simplification that has been produced in some industries by standardization is perhaps not fully realized, a few examples may be helpful:

"In 1918 one manufacturer of



Boulder Canyon

*Reprinted from *The Electric Journal*.

OIL SHALE IN FOREIGN COUNTRIES

Special Interest Attaches To Oil Shale In Countries Deficient In Coal—Practically All European Countries Have Shale—Unusual Condition In Japan—Brazil And Australia Have No Large Coal Deposits

THE production of oil from shale is a matter of world-wide interest, especially in countries that are deficient in coal deposits. Brazil is a case in point. Without coal or oil in quantity, Brazil faces the task of procuring a cheap, domestic supply of fuel in order to avoid the high cost of importations. Her relief will come in the development of her extensive beds of oil shale, locally called turfa. These have been reported on favorably by experts and their development is in progress. Mackenzie College, at Sao Paulo, has organized a research department for a study of the problem. The turfa yields up to 113 gallons of oil to the ton.

Similar conditions exist in Australia and Tasmania. The deposits of New South Wales have been worked intermittently for years; the government has offered a bounty; engineers have reported favorably; but the net results have not been satisfactory even though the local price of oil is high. An analysis of the condition seems to indicate that the personal element has been at fault in that labor has made inordinate demands and the technical advisers have failed to design and use a retort adapted to the oil shale to be treated. In Tasmania, where similar economic conditions exist, a different and probably successful plan of operation is being pursued. Under government direction a survey of the oil shale deposits is now under way. Tests of the shale will be made and oil shale retorts built and operated until the type adapted to Tasmanite—the local name for oil shale—is determined upon.

In South Africa extensive deposits occur. British capital is interested, properties are being opened, and experimental retorts erected. The purpose is the same as elsewhere—economic necessity. British interests are also present in Burmah-Siam where extensive deposits have been opened and similar work is being done.

In Canada large deposits are known to exist in Nova Scotia, New Brunswick, and Newfoundland. During the past year the deposits of Newfoundland have been the subject of special study. Bore holes show shale to a total thickness of 481 feet; the thickest strata measured 24, 30, 64, and 234 feet, each. The deposits extend over an area of 200 square miles. In Nova Scotia, stellarite

VICTOR C. ALDERSON
President Colorado School of Mines

—the local name for oil shale—occurs at New Glasgow, is a torbanite, rich in oil possibilities, close to transportation and to market. Various bore holes aggregating 20,000 feet of drilling show shale strata of a total thickness of a thousand feet. In New Brunswick occur the famous Albert mines where Albertite has been mined. This is a rich shale and yields 40 imperial gallons of oil and 57 pounds of ammonium sulphate. The economic necessity of a domestic supply of oil exists here as elsewhere. The deposits in Canada are sufficient to last for centuries.

In Japan a special condition exists. The oil shale beds occur in connection with coal beds. Neither the coal nor the shale can be worked successfully alone but by distributing the cost of mining over both products, success is expected. Extensive investigation is going on in Japan and a suitable retort is desired. English explorers for oil in Chinese Turkestan report great deposits of oil shale in that country but definite information is lacking.

In nearly every country of Europe oil shale deposits are found. In Italy the product is used extensively in road making. In Switzerland the deposit yields ichthyol, a skin specific which has a world-wide use. In France, where oil is high priced, extensive work is in progress, especially in the southern part, to produce a retort adapted to the local shales. Germany is making desperate efforts to produce oil locally so as to be independent of foreign supplies. The most important work is being done at Messel, near Darmstadt, where there is a commercial plant, complete with mining equipment, retorts, condensers, refinery, wax and ammonium sulphate plants. In Spain, at Puertobello, is another plant now in continuous operation producing 3,500 gallons of crude oil a day. In Scotland the oil shale industry has been in existence for nearly three quarters of a century. When the price of imported crude oil was high shale oil produced in Scotland competed with it successfully. However, during the recent excess oil production the oil shale industry in Scotland was seriously affected. When the price of crude oil

advances, as it undoubtedly will, the industry will return to normal. In England oil shale deposits are known in Norfolk county, on the English Channel, and in west Somerset. The disadvantage connected with the English deposits is the excessive amount of sulphur they contain. The removal of this sulphur economically is the great oil shale problem facing the English scientific men. When this problem is solved England can produce enough domestic oil to be free of importation.

In Sweden occur two great deposits; one at Närke, the other at Kinnekulle. It is estimated that 2,260 million tons are easily accessible. The government has expended large sums on experimental work at Stockholm where an experimental retort has been developed; a full sized commercial plant is now being erected at Kinnekulle. The cost of production is so low that probably 60 percent of the oil now being imported can be replaced by domestic oil produced from shale. Keen interest in shale oil production is found in Esthonia, where the deposit lies near the surface, extends for miles along the shore line of the Gulf of Finland, and dips slightly to the south. Steam shovel operations remove the shale at low cost. The raw shale is extensively used as fuel. The Esthonian government realizes that in oil shale lies her greatest undeveloped source of wealth. For this reason the government has supported intensive experimental work, has opened up deposits on its own account, has granted concessions to induce foreign capital, especially English, to come in, and in every way possible has endeavored to develop the industry. Inasmuch as Esthonia is one of the small Baltic states that broke away from old Russia and is building up an independent national existence her efforts are to be watched with more than usual interest.

From such a world-wide survey, brief as it may be, of the fuel situation as it applies to the supply of oil, it must be recognized that oil shale contains the one great world wide reservoir of oil. As oil wells diminish in flow, as they surely will, oil from shale will supplement the supply. There can be no reasonable doubt of the immensity of the supply of oil shale, the world over. The problem is merely one of utilizing it as a source of oil.

CURRENT OIL SHALE NOTES

TWO field parties are now at work resurveying oil shale lands in the DeBeque district of Colorado. A third party may be put at work after July 1, as soon as funds are available. This resurvey is accomplished under the appropriation secured by Senator Phipps of Colorado.

Assessment work in the DeBeque district is now under way by a number of companies, notably by the General Oil Company, the Superior Shale Oil Company, by the Overland Producing and Refining Company, the U. S. Oil and Refining Company and on the Phenol group.

The Catlin Shale Products Company plant at Elko, Nevada, claims the record of being the most advanced and the only oil shale plant in commercial operation in the United States. In successful operation it excels similar work in England, Esthonia, France, Germany, Australia, South Africa, Tasmania, Brazil and Japan. It is surpassed only by Scotland. The daily capacity is 100 tons. The products placed on the market are gasoline, used successfully by local autoists and "Monte" Monton the air mail pilot in his flights about Elko, lubricating oils, marketed in New York, distillate and wax.

The Naval Oil Shale reserve in Colorado covers 45,444 acres; in Utah, 86,548 acres or a total of 131,992 acres. If only 100,000 barrels are produced from each acre there is a potential supply of 13,199,200,000 barrels of oil. If loss is allowed for this is more than the estimated amount remaining in all the oil pools of the United States and also more than has ever been produced from all the wells in the United States. All this is reserved for the use of the United States Navy alone.

A recent report on the Ermelo South African torbanite, or rich oil shale, by Prof. Stanley shows a yield of 86.6 gallons to the ton. The gasoline produced was 20 percent of the crude oil, water white, and as good as any gasoline in the market. An English company has been organized to develop the deposit.

The first official recognition of oil shale by members of the cabinet was given recently at a conference in Washington arranged by Senator Lawrence C. Phipps of Colorado. There were present Secretaries Hoover, Work, and Wilbur, Rear Admiral Hilary P. Jones, Director George Otis Smith of the Geological Survey, besides many other officials. Dr. Victor C. Alderson, president of the Colorado School of Mines, was the principal speaker. After the conference a practical demonstration, on a laboratory scale was made under the direction of Dr. W. V. Norris. The raw shale was distilled into crude oil and

gas. From the oil gasoline was produced. Besides the working retort samples of the various products derived from the shale oil and samples of oil shale from foreign countries were also shown. The exhibit aroused keen interest and was visited by many senators and representatives. The purpose of the conference and the exhibit was to support Senator Phipps in the passage of an appropriation of \$90,000 to erect a plant in the Naval Reserve in Colorado. Unfortunately the bill failed to pass on account of filibustering in the Senate in the expiring hours of the session.

Japan is showing a lively interest in oil shale. A representative of the government is now in Scotland making a run on Fu Shun shale in a Scotch retort at Pumphreston. A delegation of four officials of the Nippon Oil Company is now in this country making a careful personal study of our oil shale resources and the various types of retorts proposed. The Japanese plan involves a \$2,500,000 plant that will treat 700,000 tons of shale a year. This will eventually be increased until it treats enough shale annually to supply the entire Japanese country with crude oil; that is, approximately 750,000 tons.

INDUSTRIAL CONCILIATION LAW

IN connection with consideration in the United States of the subject of promotion of industrial relations, interest attaches to a recent law enacted in South Africa. It is described by the Department of Commerce as "an interesting experiment in the adjustment of relations of capital and labor." It is known as the new industrial conciliation law and has been effective since March 31.

The legislation in part is a result of the acute labor troubles which arose in the gold mines of the Rand in 1922. It supersedes an earlier Transvaal enactment of 1909 and is expected to take the place also of the voluntary conciliation machinery established by the Brace Commission after the subsidence of the Rand revolt. The earlier Transvaal act was regarded as too rigid and bureaucratic.

INDUSTRIAL COUNCILS

The new law, the first applicable to the whole Union, is the result of long deliberation, and is apparently agreeable to all concerned. It is an experiment, nevertheless, and its acceptance in practice remains to be tested. The underlying idea is to provide machinery whereby employers and employed may, with a minimum of official interference, find the means of dealing currently with their common affairs and effect concilia-

tion when trouble brews. Provision is made for standing industrial councils, equally representative of employers and workers, for the consideration of all matters of interest in the trade or industry affecting their relations. Such councils already exist in a voluntary way in the gold mining industry.

The standing industrial councils may be national or local, according to the nature or interests of the trade or industry. In areas where such councils do not exist conciliation boards ad hoc may be appointed for the settlement of particular disputes. The number of persons constituting such a board may be agreed upon by the parties concerned, or, failing such agreement, by the Minister of Mines and Industry, under whose general control and supervision the operation of the act is placed. The members are nominated one-half by either side. A chairman shall be chosen, and the minister shall provide the necessary secretarial and clerical assistance at the expense of the government.

ARBITRATION PROVIDED

Provision is made for the appointment of a mediator by the minister, upon request or on his own motion. The mediator may attend meetings of the council or board at which the dispute is being considered and may act as chairman. These mediators may be of help to the disputants in the case of a deadlock.

There is also provision for arbitration when the parties voluntarily ask for it. An umpire must be named to give a decision if the arbitrators fail to agree. An award made by arbitrators or umpires is binding, and anyone who fails to accept or carry out such award shall be guilty of an offense. Strike or lockout is unlawful when an arbitration agreement has been arrived at, or during the period of operation of an arbitration award.

The law authorizes the minister, upon application by parties, to declare any agreement which has been reached to be binding on the parties, or he may extend its terms to other employers and employees within a suitable area. One month's notice is required of demands or of proposed alterations in terms of employment, to prevent precipitate action on either side. The minister may make such publication as desirable of reports and awards. Provision is made for the registration of trade unions and employers' organizations.

In Argentina the President of the Labor Department will soon present to the Ministry of the Interior a project which will provide for the creation of a special court for the decision of questions arising from the application of labor laws.

NEW EQUIPMENT CATALOGS

A new Jeffrey Catalog No. 397, featuring equipment for the cement, stone and allied industries, just has been issued.

To meet the growing demand for Jeffrey equipment, this catalog has been compiled to show the wide variety and application of chains and attachments, sprocket wheels, conveyors, elevators, pulverizers, crushers, lime grinding plants, manganoid balls and linings for tube mill service, portable loaders, portable bag stackers, etc., as well as the complete service rendered by Jeffrey engineers to these industries.

Hyatt Roller Bearing Company has just issued Bulletin 390, on roller bearings for coal mine cars, detailing the development of mine haulage, requirements of modern mine cars, power saving, Greensburg and Carbondale power tests, lubrication saving, retruckung old cars, initial cost, and complete information concerning Hyatt service. Copy of catalog will be sent upon request.

The Osgood Company, Marion, Ohio, has recently added continuous tread equipment to its line of mountings for standard shovels, supplementing the railroad truck and traction mountings.

The continuous tread mountings are made for shovels of dipper capacities ranging from 1½ to 6 cubic yards; can be easily put on in the field to replace other mountings and are easily removed when it is necessary to move the shovel by rail.

The new continuous tread mounting has much in common in the way of advantages with the heavy traction mounting introduced to the industry by the Osgood Company. These advantages are briefly that track and accessories are eliminated; the pit crew is dispensed with or greatly reduced; the shovel can be kept in the most effective digging position, can back away from blasting and can travel and work in water; and that the time required for changing locations is very greatly reduced.

Workers in steel mills, foundries, tube mills, drop forge shops and other places where the heat is intensive will be interested in a new, high efficiency, man-cooler fan just developed by the Buffalo Forge Co., of Buffalo, N. Y. This unit is made in two sizes, the larger having a 36-inch diameter fan wheel while the smaller has a 30-inch wheel. The entire fan is of heavy construction to insure against vibration; the screen enclosing the fan wheel is extra heavy, while the rim itself is made of 2¼ x 2¼ angle. The unit, however, can be moved easily from place to place.

The Oxweld Acetylene Company, Long Island City, Chicago and San Francisco, has just published a handsome new 48-page catalog illustrating and describing in detail its extensive line of acetylene generators and oxy-acetylene welding, cutting, brazing, lead burning, heating and decarbonizing equipment. The book is replete with information useful to the user or prospective user of oxy-acetylene apparatus.

WASTAGE OF MEN

Machinery Prevents Unnecessary Toil

THE July issue of the Monthly Labor Review contains among the articles of special interest one on the wastage of men, by Ethelbert Stewart, U. S. Commissioner of Labor Statistics. The tragedy of human waste is emphasized by Mr. Stewart in connection with the unnecessarily arduous toil which many workers are required to perform, especially since such work can be handled by machinery with much greater efficiency. By the use of labor-saving equipment it becomes possible to concentrate men upon productive work at better pay and thereby reduce the amount of social restlessness so prevalent among the workers of the world today. Besides the use of men for tasks which offer them little or no incentive there is great waste

of man-power through unemployment and lost time; through labor turnover which is very largely concerned with the unskilled and semiskilled workers; and through plant inefficiency, while in the agricultural industry there is great labor waste by reason of inefficient and outworn methods of farm management and operation. The remedy for the industrial economic and social ills resulting from these conditions is considered to lie in the "reform of our manufacturing and industrial methods upon a basis of human conservation and helpfulness rather than upon human deterioration and wastefulness."

Steadying the workers' income—a study of out-of-work benefit plans—shows what is being done to alleviate the ill effects of unemployment by the workers themselves through the trade unions, and by employers and workers through joint assumption of the unemployment risk. The latter plan is the one most favored by the workers at the present time because of the inadequacy of the insurance against unemployment which the national and local trade unions have been able to support and the increasing belief of union members that unemployment, like accidents, should be, to some extent at least, a charge upon industry.

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PRODUCTION GOLD AND SILVER 1923

GOLD and silver production for 1923 is reported for the following states by the Mint Bureau and Geological Survey:

| | Gold | | Silver | |
|----------------------|---------|-----------|------------|------------|
| | Ounces | Value | Ounces | Value |
| Pennsylvania | 131 | 2,700 | 1,278 | 1,048 |
| South Carolina | 14 | 300 | | |
| South Dakota | 307,012 | 6,346,500 | 95,822 | 78,574 |
| Tennessee | 319 | 6,600 | 109,086 | 89,450 |
| Texas | 44 | 900 | 825,267 | 676,719 |
| Utah | 156,991 | 3,245,300 | 20,479,550 | 16,793,231 |
| Washington | 16,733 | 345,900 | 240,712 | 197,384 |
| Wyoming | 24 | 500 | 163 | 134 |
| Porto Rico | 5 | 100 | 184 | 151 |
| Philippines | 76,137 | 1,573,900 | 39,360 | 32,275 |

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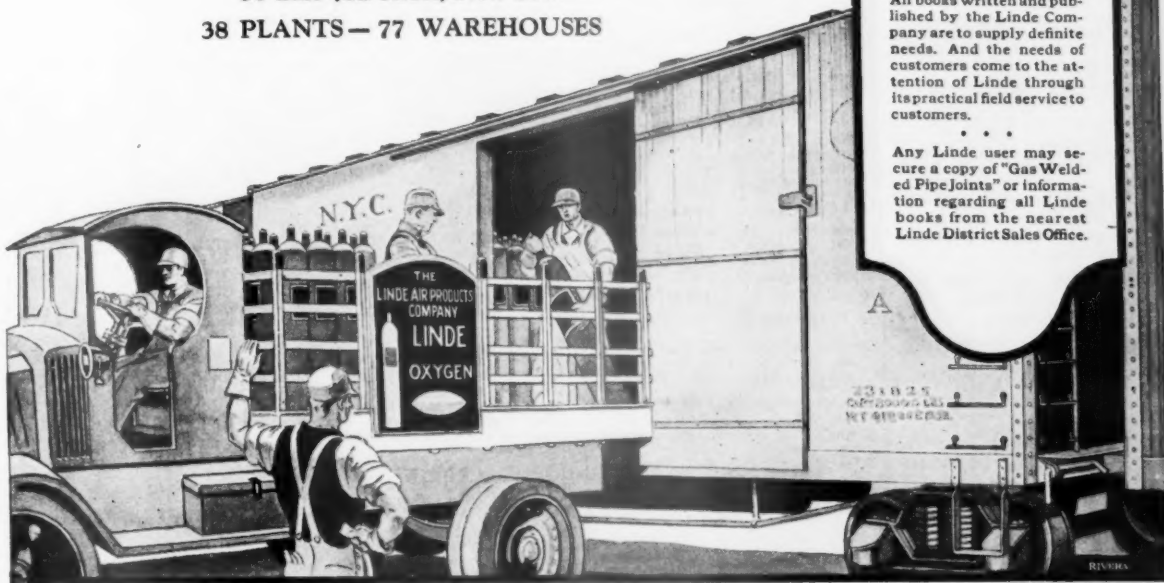
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New York City.

ACID, SULPHURIC

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Works, Irrington, N. J.

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cago and New York.

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kee, Wis.
Ingersoll-Rand Co., 11 Broadway,
New York City.

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The Lunkenheimer Co., Cincinnati,
Ohio.

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Bowerston, Ohio.

AUTOMATIC CAGE STOPS

Mining Safety Device Co.,
Bowerston, Ohio.

AUTOMATIC CAR CAGES

Connellsville Mfg. & Mine Supply
Co., Connellsville, Pa.

AUTOMATIC FEEDERS

Mining Safety Device Co.,
Bowerston, Ohio.

AUTOMATIC FEEDERS, GRAVITY

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Pa.

AUTOMATIC (Mine Doors, Truck and Electric Switches)

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AUTOMATIC SWITCH THROWERS

G. M. Johnson Mfg. Co., Jeannette,
Pa.

AUTOMATIC WEIGHING MACHINES

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ing Co., Chicago, Ill.

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town, N. Y.

BEARINGS (Roller)

Hyatt Roller Bearing Co., Harri-
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Morse Chain Co., Ithaca, N. Y.

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Giant Powder Co., Con., 1st Nat'l
Bank Bldg., San Francisco, Calif.
Hercules Powder Co., 934 King St.,
Wilmington, Del.

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Atlas Powder Co., Wilmington, Del.
du Pont Powder Co., The E. I.,
Wilmington, Del.
Giant Powder Co., Con., 1st Nat'l
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Hercules Powder Co., 934 King St.,
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J. C. Stine Co., Tyrone, Pa.

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Sweet's Steel Co., Williamsport,
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Wilmot Engineering Co., Hazleton,
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Columbus, Ohio.

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Jeffrey Mfg. Co., 958 N. Fourth St.,
Columbus, Ohio.

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American Mine Door Co., Canton,
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Lidgerwood Mfg. Co., 96 Liberty
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Mining Safety Device Co., Bowers-
ton, Ohio.

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G. M. Johnson Mfg. Co., Jeannette,
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Morse Chain Co., Ithaca, N. Y.

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Lehigh Coal & Navigation Co.,
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Thorne, Neale & Co., Philadelphia,
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ber of Commerce Bldg., Pitts-
burgh, Pa.

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Jeffrey Mfg. Co., 958 N. Fourth St.,
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St., New York City.

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Jov Machine Co., Union Trust
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Ingersoll-Rand Co., 11 Broadway,
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Jeffrey Mfg. Co., 958 N. Fourth St.,
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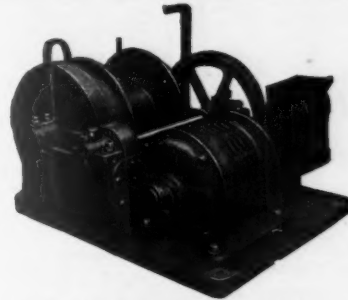


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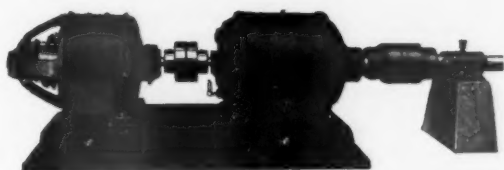
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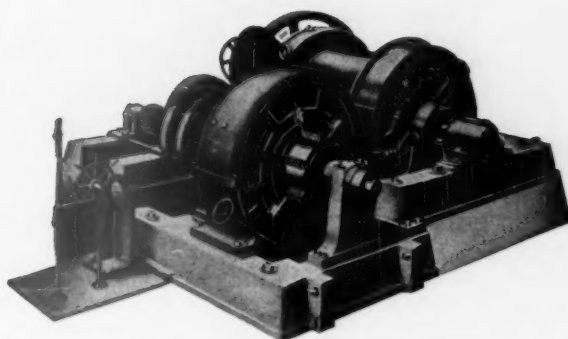


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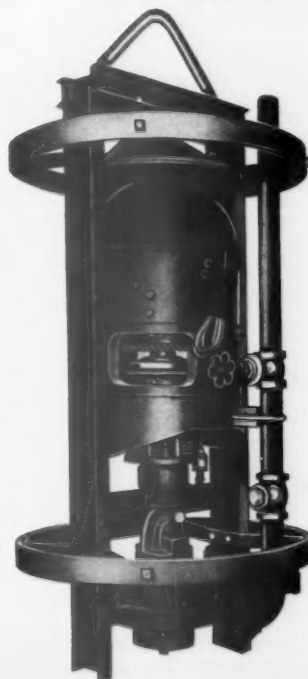
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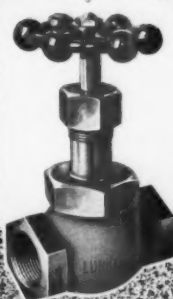
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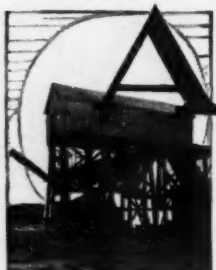
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